Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

JANUARY 1954

FOR OFFICERS AND SUPERVISORS RESPONSIBLE FOR DESIGN, CONSTRUCTION AND MAINTENANCE OF MOTIVE POWER AND ROLLING STOCK

formerly Railway Mechanical and Electrical Engineer

B&O Electric Shop

Wheel Grinding on Belt Railway

N&W Hot-Box Investigation

Electric Truck Availability on PRR

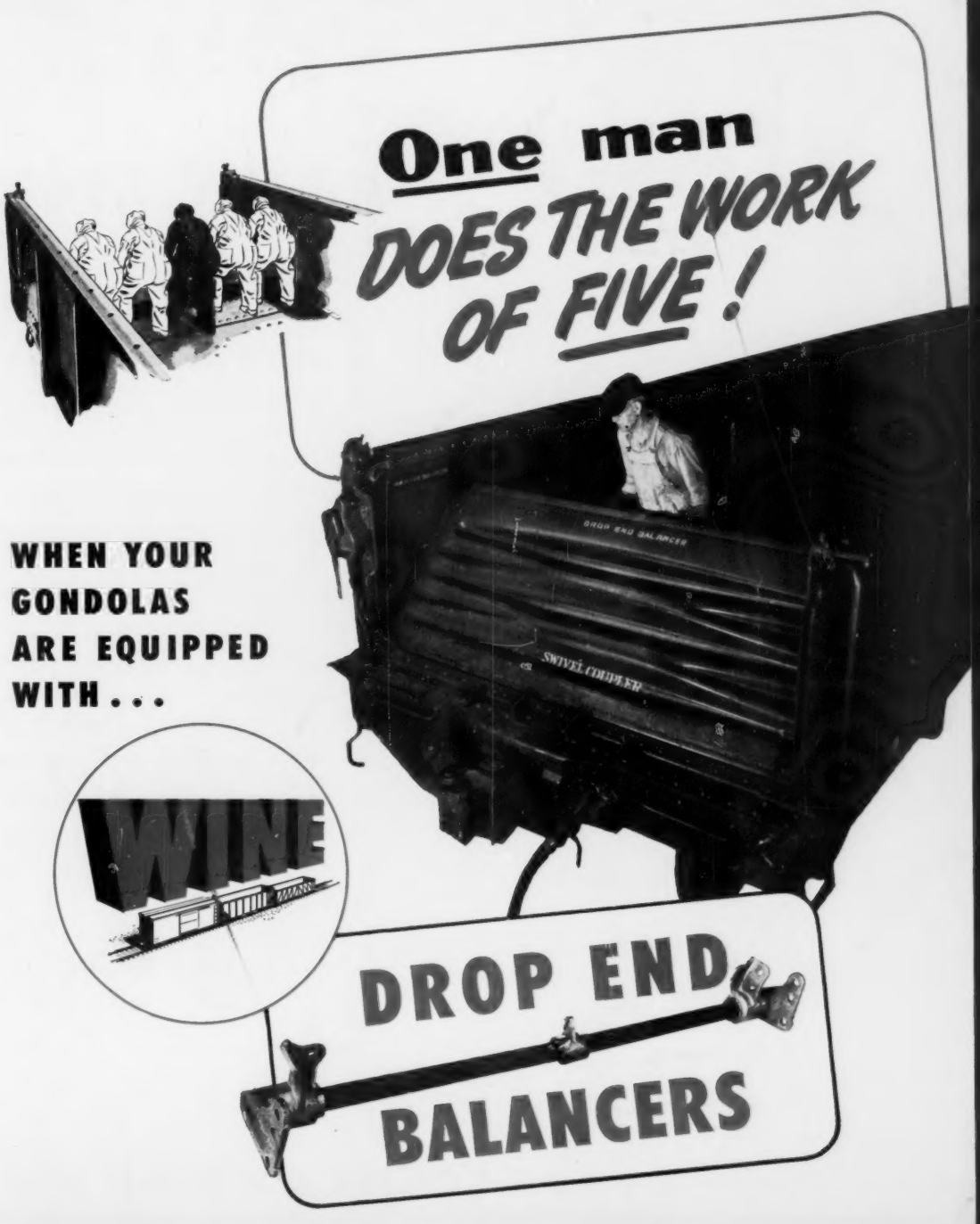
10 New GM Diesel Locomotive Models

Reading Instruction Car

Santa Fe Generator Drive Problem

Diesel and Air Brake Questions and Answers

New Devices


One man
DOES THE WORK OF FIVE!
WHEN YOUR GONDOLAS ARE EQUIPPED WITH . . .
WINE
DROP END BALANCERS
THE WINE RAILWAY APPLIANCE COMPANY • TOLEDO 9, OHIO

Even

CAN'T

THE chances
might knock
in ten million

But because opera
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Truslock's new in
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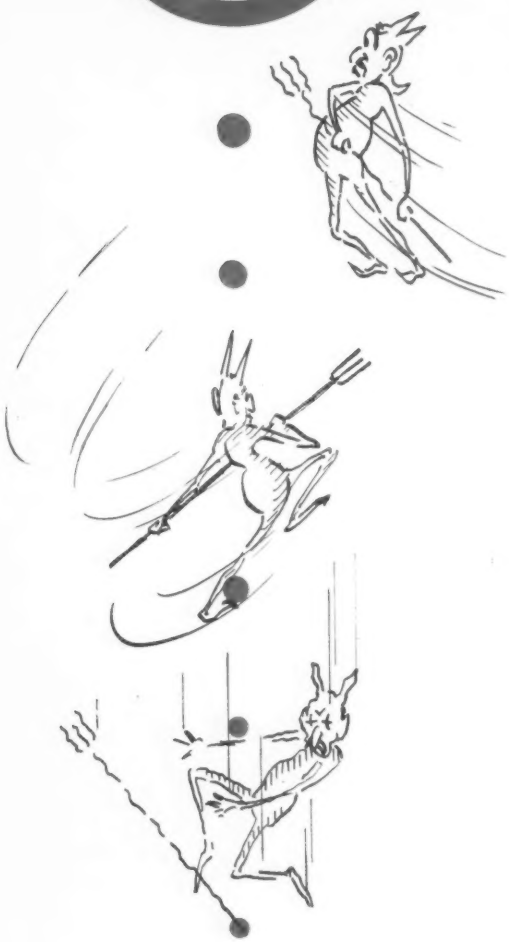


This new Key-Guard Truslock Brake Head costs more to manufacture—but it costs you not a penny more. The most precious commodity we brake rigging people can sell is a good night's sleep for our customers.

Truslock's ten years of intensive development, plus millions of miles of proven service under every conceivable operating condition is paying off for 60 railroads and private car lines who now specify "TRUSLOCK" for hangered brake beam maintenance.

WA
PAG

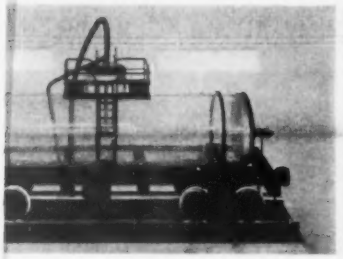
BUFFALO BRAKE BEAM COMPANY

NEW YORK • BUFFALO • HAMILTON, ONT.

NEW OAKITE FOGGING UNIT slashes hours off car cleaning time

AVY

GES



Model Tank Car

Transparent body of this model tank car gives you a pretty good idea of how the Oakite Fogging Unit operates. Here it is shown, in position, reaching every inch of soiled surface with a detergent-saturated steam fog. Soils quickly loosen, oils melt. Grime slides to tank car bottom for easy drain off.

T has manual cleaning of tank car ild—it's a *mechanical* method. Does car turnaround. Removes moderate ied "muscle" methods. Unit is simple t's economical to operate.

pray nozzles mounted at the business tank car through dome. Its 18 inch able Oakite Cleaner are fed to nozzles. ed, nozzles "let go" with a detergent- urface. Soils lose their grip, oils melt with Unit completes the job.

fee to users of Oakite Cleaning Com-

pounds. For particulars drop a line to Oakite Products, Inc., 46 Rector St., New York 6, N. Y.

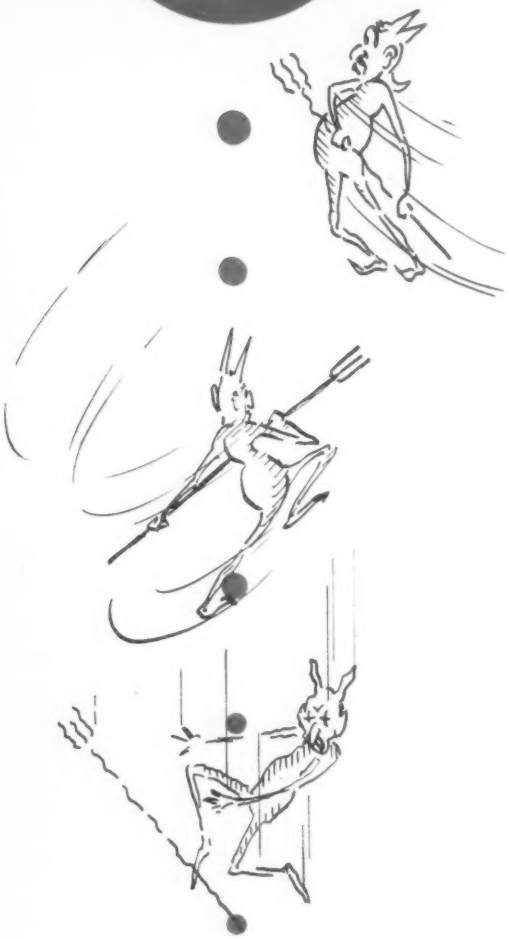
OAKITE PRODUCTS, INC., 46 Rector Street, NEW YORK 6, N. Y.
In Canada: Oakite Products of Canada, Ltd. 65 Front St. East, Toronto, Ont.

OAKITE

RAILWAY DIVISION

Even the Gremlins

CAN'T LICK THIS!



THE chances that a flying object or track obstruction might knock out a Truslock Brake Head Key are one in ten million.

But because operating men lie awake nights worrying about gremlins and million-to-one shots, we've added the ultimate in safety factors for a demountable head type brake beam.

Truslock's new integrally-cast key guard is 100% knock-out proof. We'll guarantee that the meanest gremlins on your railroad can't lick this one.

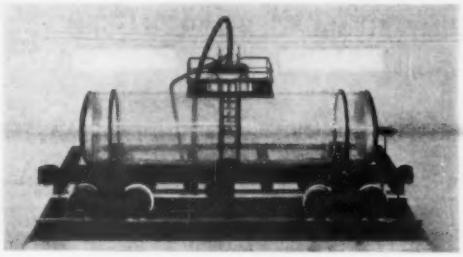
This new Key-Guard Truslock Brake Head costs more to manufacture—but it costs you not a penny more. The most precious commodity we brake rigging people can sell is a good night's sleep for our customers.

Truslock's ten years of intensive development, plus millions of miles of proven service under every conceivable operating condition is paying off for 60 railroads and private car lines who now specify "TRUSLOCK" for hangered brake beam maintenance.

BUFFALO BRAKE BEAM COMPANY

NEW YORK • BUFFALO • HAMILTON, ONT.

NEW OAKITE FOGGING UNIT slashes hours off tank car cleaning time



Model Tank Car

Transparent body of this model tank car gives you a pretty good idea of how the Oakite Fogging Unit operates. Here it is shown, in position, reaching every inch of soiled surface with a detergent-saturated steam fog. Soils quickly loosen, oils melt. Grime slides to tank car bottom for easy drain off.

Railroad men tell us—this new OAKITE FOGGING UNIT has manual cleaning of tank car interiors "beat a mile". They say it saves money. It should—it's a *mechanical* method. Does away with costly hand scraping and wiping. Speeds tank car turnaround. Removes moderate soils and oils in a fraction of the time required by old fashioned "muscle" methods. Unit is simple to install and maintain. It's light and easy to handle, and it's economical to operate.

The OAKITE FOGGING UNIT consists of two opposing spray nozzles mounted at the business end of a 4½ foot twin tube assembly. It is inserted into tank car through dome. Its 18 inch diameter dome plate is secured by clamps. Steam and suitable Oakite Cleaner are fed to nozzles. With steam and solution valves open and car drains closed, nozzles "let go" with a detergent-saturated steam fog. This fog blankets every inch of soiled surface. Soils lose their grip, oils melt and residues slide to tank car bottom. High pressure rinse with Unit completes the job.

The OAKITE FOGGING UNIT may be rented at a nominal fee to users of Oakite Cleaning Compounds. For particulars drop a line to Oakite Products, Inc., 46 Rector St., New York 6, N. Y.

OAKITE PRODUCTS, INC., 46 Rector Street, NEW YORK 6, N. Y.
In Canada: Oakite Products of Canada, Ltd. 65 Front St. East, Toronto, Ont.

OAKITE
RAILWAY DIVISION

Engineer's Rear View Mirror

The Type "B" Brake Pipe Flow Indicator is much like a rear view mirror—it reflects what is going on in the brake pipe of his train—ofttimes a mile and a half away.

Westinghouse Air Brake
COMPANY

AIR BRAKE DIVISION WILMERDING, PA.

January, 1954

VOLUME 128

No. 1

RAILWAY LOCOMOTIVES AND CARS

Founded in 1832 as the American Rail-Road Journal.

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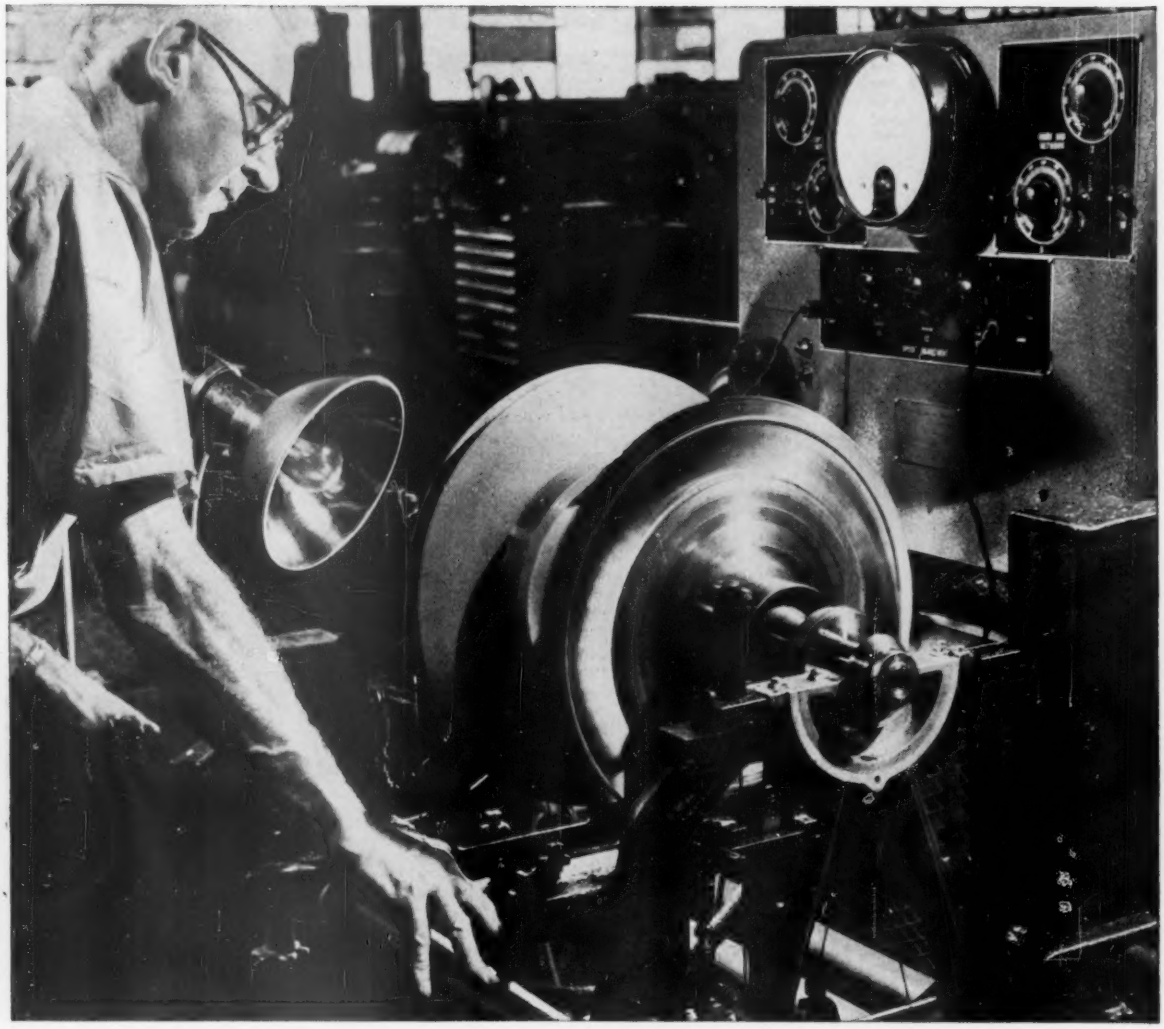
How Alco Repair Services Save You Time and Money

THREE-WAY ALCO SERVICE



BALANCING TURBOCHARGER ROTOR ASSEMBLY is only one of the many precision tests performed as a regular part of Alco's fast, economical three-way service. Conducted by skilled craftsmen working with the most modern equipment, these tests assure like-new performance of all Alco-repaired engines and parts.

Alco AMERICAN

OFFERS YOU
THREE-WAY MAINTENANCE SAVINGS

Available at Alco Factory Rebuild Headquarters at Auburn, N. Y., and at each of six Regional Warehouses, Alco Repair Services are bringing new savings in locomotive and parts maintenance to railroads all across the country.

Three distinct types of Repair Services are offered, each backed by new-part warranty:

THREE-WAY SERVICE

1. Repair and return of your own engines and parts—repaired to original design specifications or modernized at your option.
2. Unit exchange—which gives you prompt delivery of "factory rebuilds" in return for your old engines or parts.
3. "On line" rebuild of locomotives on your own premises.

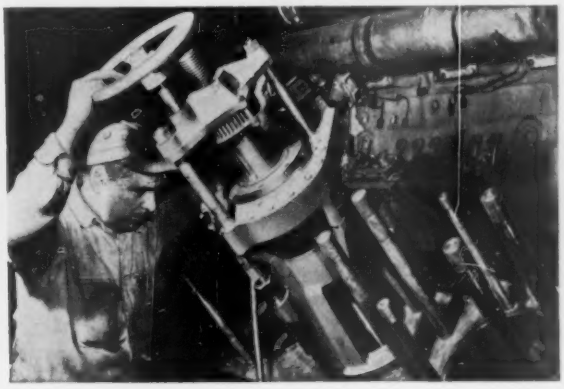
Fast, thorough, using the most advanced techniques and facilities, these three types of Alco Service enable you to cut your maintenance costs three ways:

THREE-WAY SAVINGS

1. Cut your costs on overhead, shop equipment, and labor.
2. Help you solve your emergency maintenance problems and stabilize your maintenance schedules.
3. Keep your locomotives in peak operating condition mile after mile, year after year—using facilities, engineering, and experience of original manufacturer.

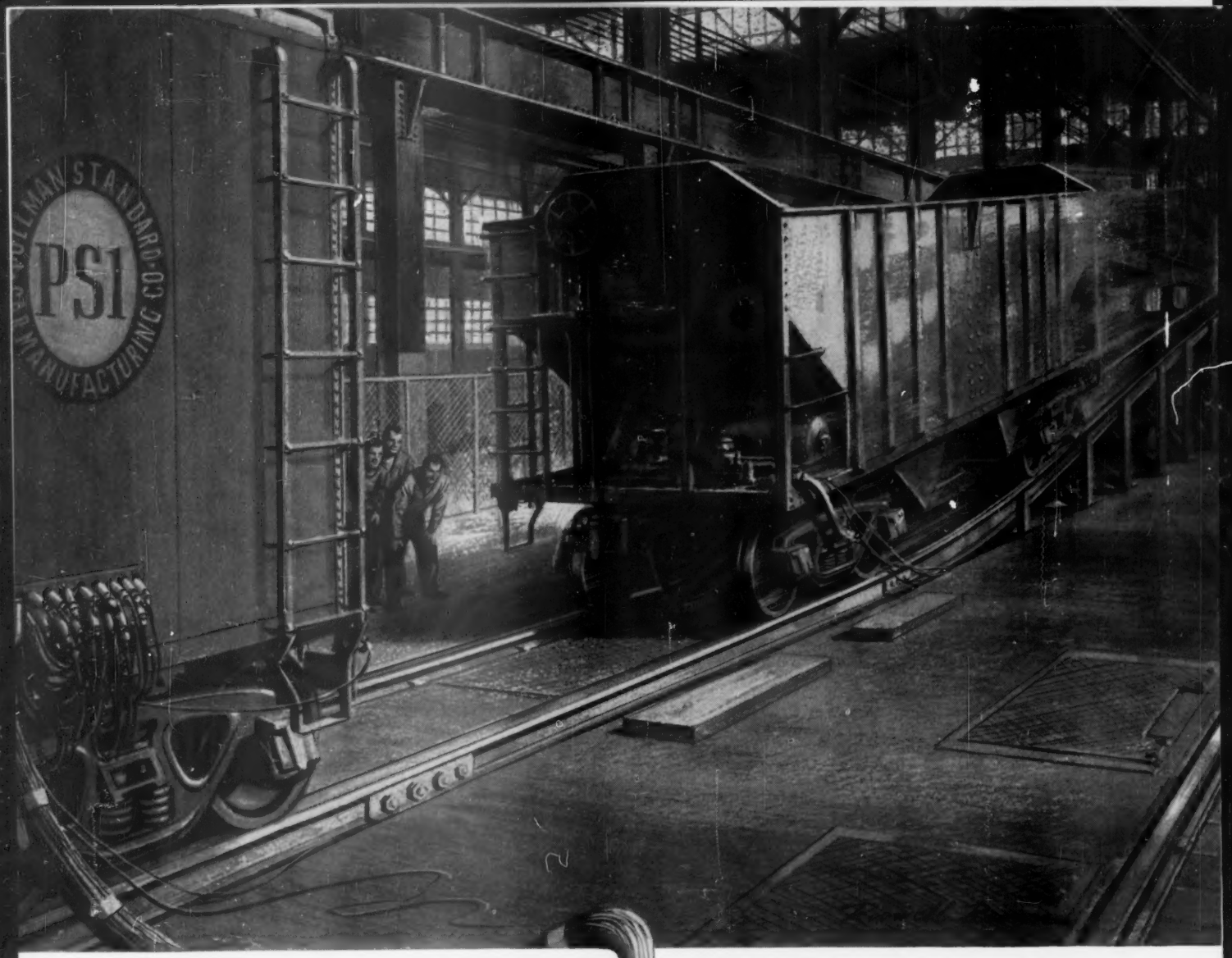
How familiar are you with the *real* cost of your present repair operations? Look into it soon—in terms of time, equipment and money. Then ask your nearest Alco representative for complete information on fast, economical Alco Repair Service.

PREMACHINED PISTON-RING CARRIERS, typical of replacement parts produced by Alco in production lots, stand ready at Factory Rebuild Headquarters for immediate installation—in engines to be returned after minimum time out of service, with new-equipment warranties.



SPECIAL TOOLS and factory facilities are often essential to really efficient repair of locomotive engines and parts. The unique boring tool above was specially designed by Alco to simplify the remachining of welded lower liners in diesel engine cylinder blocks.

LOCOMOTIVE COMPANY Sales and Service Offices in Principal Cities

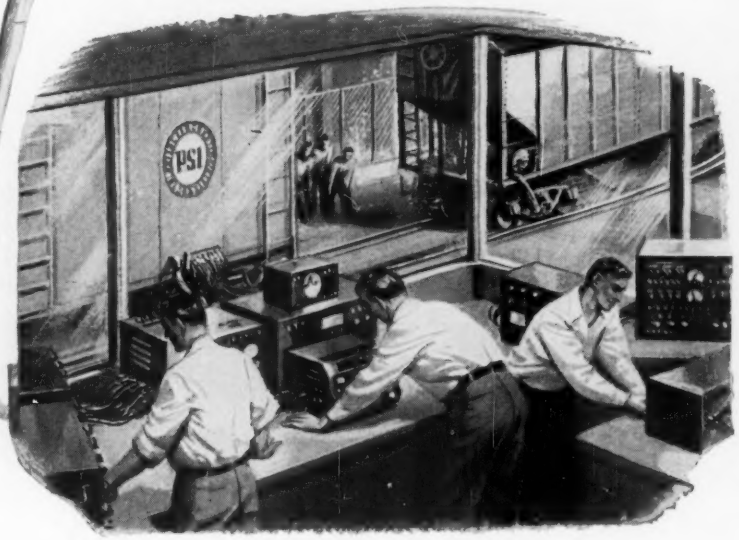


GETTING THE GOODS ON A CAR KILLER

Operation impact! A planned collision to see how the standardized PS-1 takes it. The all-welded hopper car is fully loaded as it comes down the ramp to smash into the PS-1. Speeds as high as 18 mph. can be obtained in order to get the data that makes the PS-1 a better and better box car.

RECORDING THE EVIDENCE

At the scene of the test, Research & Development engineers using the latest electronic equipment, record the information from the impact. The stresses and strains are measured precisely and then the facts are used in the design and construction of the PS-1. Tests such as this make the improvement of the PS-1 continuous.



Science builds a better box car

RESEARCH AND DEVELOPMENT TESTS ARE THE *FIRST* PROOF THAT EVERY PS-1 CAN TAKE IT

Pullman-Standard Research and Development engineers have never stopped testing, proving and *improving* the standardized PS-1 box car. They have continued to anticipate the railroads' needs nation-wide for better box cars. That's why 56 railroads have already ordered 50,000 PS-1s. That's why these standardized PS-1 box cars are setting economical, day-after-day operating records.

Under laboratory control, Research and Development experts reproduce jolting service conditions—often more rigorous than cars would ever encounter. Such shock treatments and other tests are only part of the story of car building to meet the needs of American railroads from coast to coast. Pullman-Standard Sales and Service engineers also are following through continually with "on line" investigations of their own toward an improvement of PS-1 specifications.

All this is the Pullman-Standard way of building a quality box car that *stays in service longer* and assures railroads of time for *more revenue-producing shipments.* Still, the cost is lower than cars built to individual specifications. Ask for fast delivery schedules on the PS-1 standardized box car.

YOUR NEEDS CREATE THE PULLMAN ***"STANDARD"***

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

THE PROOF IS IN YOUR OWN YARD

Look at any freight consist and count the number of PS-1s. Here is proof that the standardized box car is the best answer to the rising costs of today's freight operations. The sturdy PS-1 is being bought and reordered by a majority of the country's leading railroads—proof that quality as well as quantity lead to the selection of a box car designed for long service life.

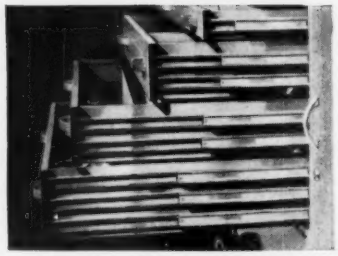
SALES AND SERVICE ENGINEERING

Pullman-Standard Sales & Service engineers travel well over 100,000 miles a year for facts on box car operating conditions. Above: data on truck wheel loadings were used by our Research and Development engineers to develop PS-1 floors that stand up under heavier materials handling equipment carrying heavier loads. All components are thus engineered for dependability.

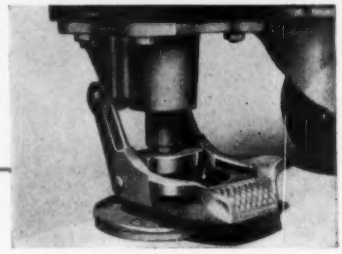
Maintenance speeder-upper!

Snap-on* ROLL-CAB

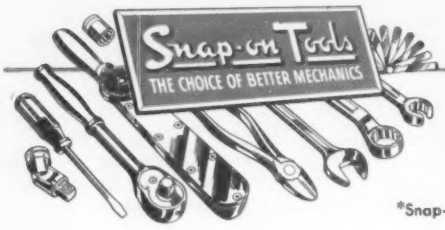
● When a man has a "shop-full" of tools, plus a sturdy bench, at arm's reach, *any* maintenance job goes faster. Shops everywhere have found Roll-Cabs the most efficient time saver and *man helper* that can be put on a job. A Roll-Cab ends those repeated trips back to the tool crib. Its smooth masonite work-top and reinforced steel construction (it weighs 388 pounds, empty!) furnish a solid base for vises, bench grinders, etc. Handy outlets for hand power tools. Full adjustable lamp. Big, rubber-shod wheels, two swiveling. Positive foot brakes. Doors have tumbler locks. Lock-bar and padlock secure drawers and compartment. Finished in durable, baked-on red enamel. Write for Industrial and General Catalogs of 4,000 Snap-on hand and bench tools. Snap-on's Railroad Division is organized to give you fast, capable service anytime, anywhere.



All drawers roll on easy, "non-spill" slides, preventing "pull-outs."



Two powerful foot brakes anchor Roll-Cab to floor instantly, release at a touch.



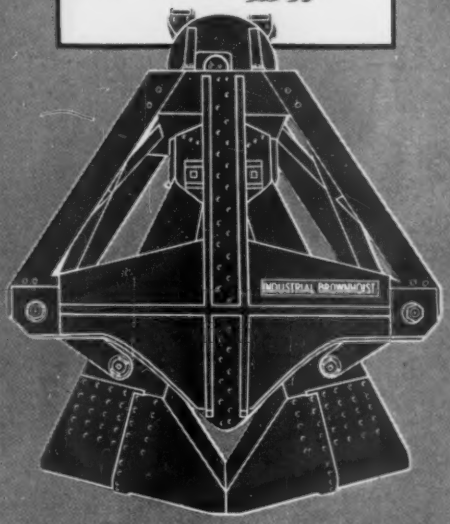
SNAP-ON TOOLS CORPORATION
RAILROAD DIVISION
8130-A 28th Ave. • Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

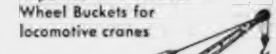
BROWNHOIST

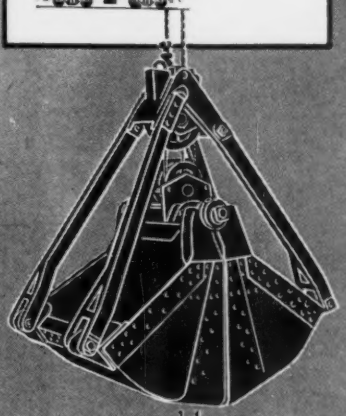
ALSO BUILDS BETTER BUCKETS

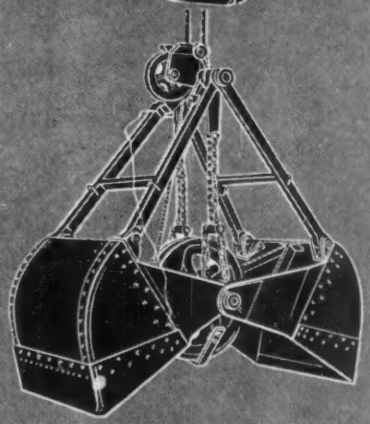
Link Type Buckets for boat unloaders, bridge cranes, fast plants



Rope Reeve and Power Wheel Buckets for locomotive cranes







Brownhoist Buckets are designed for specific jobs and especially engineered to meet the toughest materials handling requirements. They take deep, full capacity bites that move more materials per lift, thus making possible considerable savings in man-hours and production time. They are built for endurance and dependability, the same qualities that have accounted for Brownhoist leadership in the bulk materials handling field for more than three quarters of a century. Railroads, steel mills and dock operators who are loading and unloading coal, ore, slag or other bulk materials will find it pays to discuss their requirements with Brownhoist engineers.

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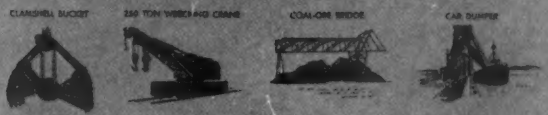
BROWNHOIST builds better cranes



INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago; Canadian Brownhoist, Ltd., Montreal, Quebec • AGENCIES: Detroit, Birmingham, Houston, Los Angeles

170,000 freight cars have been built

ONE of the original 100 covered hopper cars, series 58000, put into service by Seaboard Air Line in 1935. Doors are raised to show their "good-as-new" condition today. Made of USS COR-TEN steel—with a yield point 1½ times that of carbon steel—these doors have superior strength and toughness to stand up under service. The high corrosion resistance of COR-TEN steel is also an important factor that contributes to their unusual durability.

1933 UNITED STATES STEEL USS HIGH STRENGTH STEELS 1953
TWENTY YEARS OF PERFORMANCE

USS HIGH STRENGTH STEEL

better with USS COR-TEN steel since 1933

In phosphate-hauling hoppers on the Seaboard Air Line

18 years of service without renewals or replacements

proves life-increasing properties of USS COR-TEN steel

In 1935, the Seaboard Air Line Railroad equipped 100 phosphate hopper cars (Series 58000) with USS Cor-Ten steel roofs and hopper doors. Despite the fact that in this type of ore transport, roofs and hopper doors bear the brunt of punishment, and though these cars have been in continuous service for the past 18 years, not one door or roof has had to be replaced because of wearing out.

Here is a typical example of Cor-Ten steel's ability to minimize maintenance under quite severe operating conditions.

Just consider these facts. Although the phosphate ore is handled dry in these covered hoppers, atmospheric moisture combines with the ore to form corrosive phosphate compounds. As a result, the metal ultimately rusts out—sooner in the case of ordinary steel—very much later with USS Cor-Ten steel.

In addition, the hopper doors are subjected to severe abrasive action as thousands of tons of ore grind over the door surfaces during loading and unloading. Yet, Seaboard maintenance records reveal that USS Cor-Ten steel has withstood this combined corrosion-abrasion attack for 18 years running—the only maintenance needed has been an occasional coat of paint.

On the basis of this low-maintenance, money-saving performance, Seaboard Air Line has, since 1935, continued to use more and more Cor-Ten steel construction. They now have in service 1775 cars built with USS Cor-Ten steel roofs and hopper doors. This year, they have ordered 400 more.

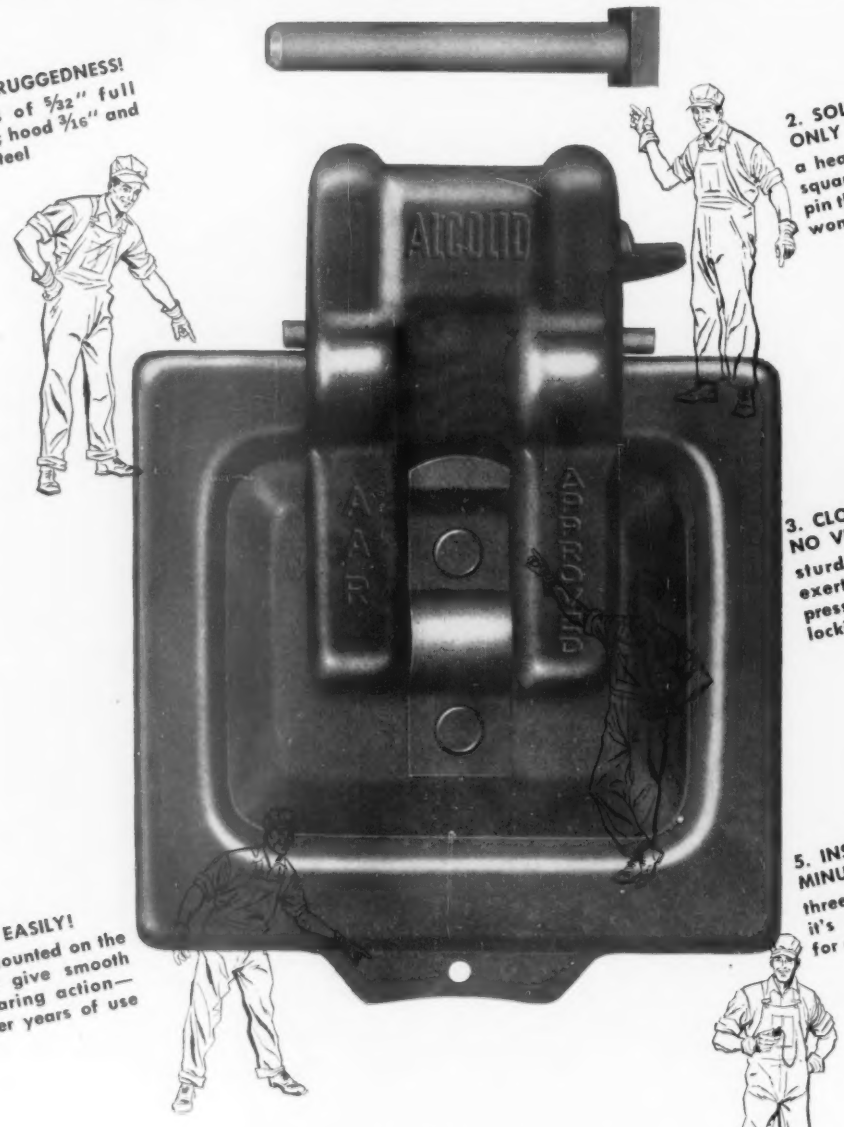
If you want your equipment to last longer, cost less to maintain, and cost less to operate, get the facts about construction with USS Cor-Ten steel. Our engineers will be glad to show you how readily this famous "steel that does more" can be applied to your designs, how little it costs, and the sound economic reasons that justify its use.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

THE excellent condition of the Cor-Ten steel hopper doors, after 18 years' service hauling phosphate ore, is clearly shown in this photograph. Cor-Ten steel's high resistance to atmospheric corrosion—4 to 6 times that of ordinary steel, 2 to 3 times that of copper steel—and its greater resistance to abrasion pay off here. Not one of these doors in 100 cars built in 1934 has had to be replaced because of wearing out.

UNITED STATES STEEL

5 REASONS WHY IT PAYS TO SPECIFY ALCOLID® the lifetime journal box lid



1. OVERALL RUGGEDNESS!
lid body is of 5/32" full section steel; hood 3/16" and strap 7/32" steel

2. SOLID IN DESIGN—ONLY TWO PARTS!
a heavy steel lid and a square-headed retaining pin that's non-rotating—won't elongate pin holes

3. CLOSES TIGHT—NO VIBRATION!
sturdy torsion spring exerts constant 50-lb. pressure for permanent locking

4. OPENS EASILY!
roller is mounted on the spring to give smooth roller-bearing action—even after years of use

5. INSTALLED IN A MINUTE!
three simple steps and it's ready to operate—for a lifetime!

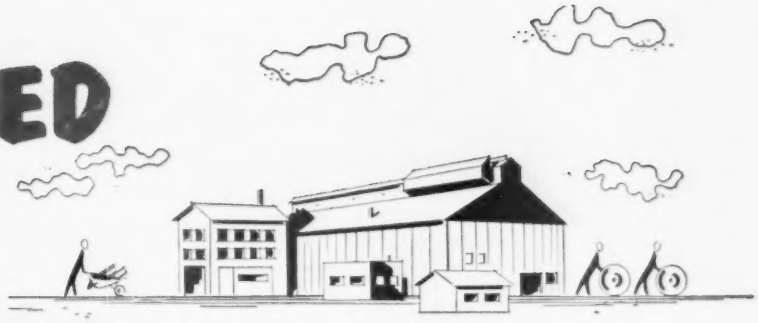
Your Alco sales representative will be glad to give you full information.

ALCOLID

RAILWAY STEEL-SPRING DIVISION
AMERICAN LOCOMOTIVE COMPANY

New York • Richmond • Cleveland • Chicago • St. Louis • St. Paul • San Francisco

NEW CHILLED CAR WHEELS



just for the price of conversion

Today, when worn wheels are turned in for new chilled car wheels under the Exchange Plan, there is no question about your getting the best value for your scrap metal.

When you swap scrap wheels for new ones, ton for ton, you pay only the conversion cost. In effect, we take your old wheel, melt it, and pour you a new one.

Besides this initial saving, AMCCW chilled car wheels save all along the line, throughout their long life. They reduce inventory requirements. They are easier to mount; they prolong brake shoe life; they insulate axles from shock; they reduce trackwork wear to the very minimum. Their safety record today is the best in their long history.

Because AMCCW plants are spotted throughout the country, the conversion plan is a practical one and means little or no foreign hauls for the railroads using the chilled wheel Exchange Plan.

In good supply
Available locally
Short-haul delivery
Reduced inventory
Low first cost
Low exchange cost
Increased ton mileage
High safety standards
AMCCW plant inspection
Easier shop handling

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
445 North Sacramento Boulevard, Chicago 12, Ill.

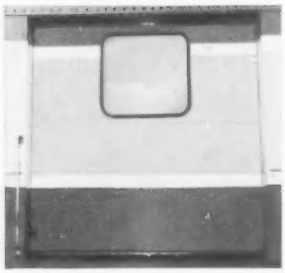
Albany Car Wheel Co. • American Car & Foundry Co. • Griffin Wheel Co.
Marshall Car Wheel & Foundry Co.
Pullman-Standard Car Mfg. Co. • Southern Wheel (American Brake Shoe Co.)

MET-L-WOOD DOORS

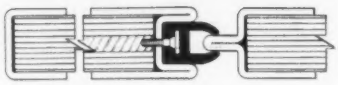
METAL BONDED TO PLYWOOD

★ LIGHT... TOUGH... DURABLE
★ NO THROUGH-BOLTS
NO WARPING
★ NO TWISTING
NO SWELLING

BAGGAGE AND POSTAL CAR DOORS



Completely weatherproof Met-L-Wood doors effectively prevent internal rust and rot... and their tough, smooth surfaces stay new-looking for years. Stainless steel channels along bottom edges of sliding doors are rustproof... virtually wearproof. All-rubber window sash installed or removed in minutes... rattle-proof... water- and weatherproof. Available in full width and split types ... sizes to meet all needs.

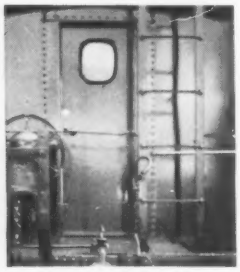


Exclusive Split Door Seal

Drawing above shows simple Met-L-Wood Split Door Seal which assures weather- and watertightness for years of continual use. Seal also provides effective cushion when closing split doors.

PASSENGER CAR END, VESTIBULE, INTERIOR DOORS

Sound-deadening, insulating, vibration-damping Met-L-Wood doors for passenger cars add to service life, cut deadweight ... Combine modern, clean-line beauty with great strength and durability. Furnished for manual or automatic operation, with or without hardware assembly. Tapping plates for hardware are built into doors ... invisible additions to strength and trouble-free service life. Sizes and types to fit all requirements ... exact dimensions insure quick assembly and perfect fit. Door thicknesses from ½" up, as required.

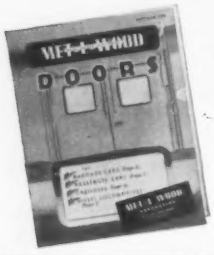


CABOOSE DOORS

Met-L-Wood caboose doors are built to last the life of the caboose—and to give trouble-free service the whole time. Weather-proof, warp-proof, rot-proof doors can be provided with or without stationary windows in all-rubber sash or with standard drop sash. Available with or without hardware. In all sizes to exactly meet specifications.

DIESEL LOCOMOTIVE DOORS

Widely used by builders on new locomotives, Met-L-Wood doors guarantee trouble-free operation of end and interior doors on diesel road locomotives and cab doors for diesel switchers. Furnished to exact dimensions, with or without windows; either with hardware installed, or with tapping plates placed for hardware assembly on the job.



Write for this Bulletin

Met-L-Wood Bulletin 520 gives the complete, illustrated story on Met-L-Wood doors for railroad uses ... shows construction details, describes standard and special types and sizes. Your copy sent free upon request—write for it today.

MET-L-WOOD
CORPORATION

6755 W. 65th Street
Chicago 38, Illinois

MET-L-WOOD • *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*

How Gulf Dieselmotive Oil combats harmful engine deposits to increase locomotive availability and reduce maintenance costs:

1 Effective detergent action of Gulf Dieselmotive Oil prevents harmful piston ring belt deposits (has the right combination and the right concentration of the right additives).

2 The selected base stocks for Gulf Dieselmotive Oil insure against hard deposits on the piston crown and area above first ring.

3 The base stocks for Gulf Dieselmotive Oil are 100% solvent refined—this insures greater stability and better bearing protection.

Call in a Gulf Sales Engineer and ask him to recommend the proper grade of this quality lubricant to improve lubrication and reduce maintenance costs for your Diesel locomotives. Write, wire, or phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION
GULF REFINING COMPANY
PITTSBURGH 30, PA.

HERE'S A

"Made-to-Order" Job

FOR

UNIONMELT

WELDING

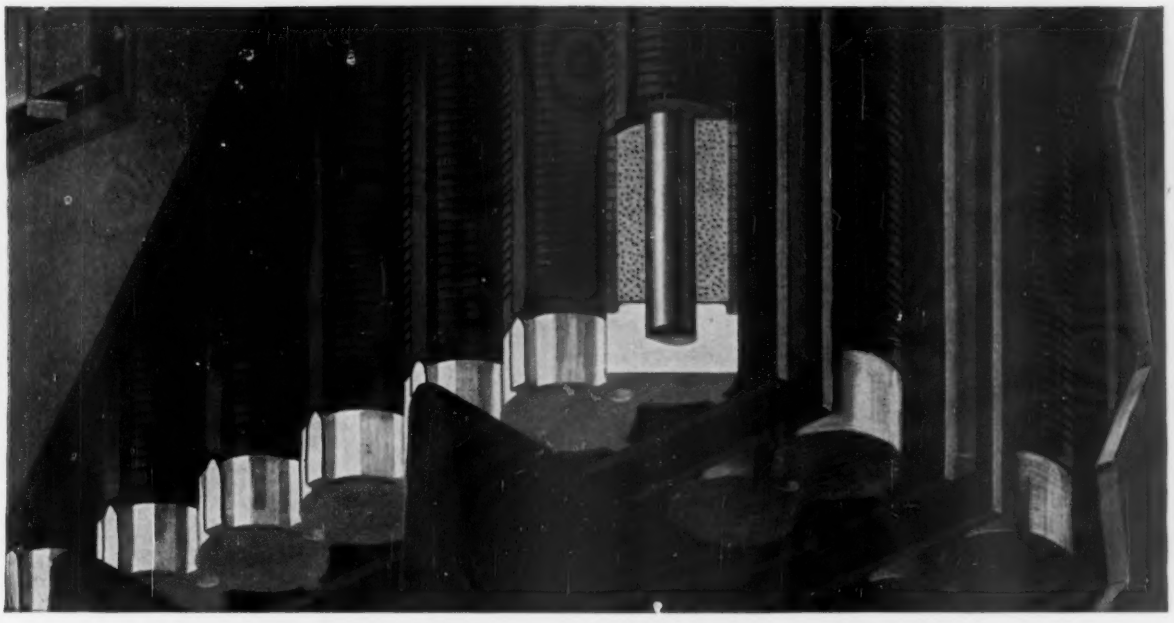
Installing nailable steel flooring in gondolas and other cars can be done at high speed and low cost using the automatic UNIONMELT method. Welding in all of the flooring of 200 gondolas at the rate of *one car an hour* was recently achieved by a Midwestern railroad. They used two UNIONMELT heads, one on each side of the car, to weld the hold down bars to the side sill and with a second pass to weld the bars to the new steel floor members.

This new use for the automatic UNIONMELT welding method is just one more added to the long list of money-saving applications for car repairs and construction.

Why don't you get more information on how UNIONMELT welding can speed operations and cut costs in your shops. Write for booklet 7767 — "New Railway Car-Building and Repair-Shop Methods."

OXWELD RAILROAD SERVICE COMPANY
A Division of Union Carbide and Carbon Corporation
UCC
Carbide and Carbon Building Chicago and New York
In Canada:
Canadian Railroad Service Company, Limited, Toronto

"Oxweld" and "Unionmelt" are registered trade-marks of Union Carbide and Carbon Corporation.



FOR ECONOMICAL AND DEPENDABLE CAR LIGHTING

Exide-Ironclad BATTERIES

From coast to coast, Exide-Ironclad Batteries help provide passenger comfort on many trains. Because of high capacity and rugged construction they meet all storage battery power needs. Exide-Ironclad Batteries assure:

AMPLE POWER for entire car lighting and air-conditioning loads . . . uniform voltage at proper values throughout run.

STEADY LIGHTS and COOL CARS even during long stops.

UNINTERRUPTED SERVICE—can be changed or recharged in yard—withstand vibration, shock, service variations and temperature differences.

LOW OPERATING, MAINTENANCE and DEPRECIATION COSTS. Exide-Ironclad Batteries meet all requirements of car design and electrical loads.

HERE'S WHY YOU GET MORE WITH EXIDE-IRONCLAD
Positive plate, containing corrosion-resistant Silvium, is different . . . unique . . . exclusive! No other type of positive plate can offer you the advantages of the Exide-Ironclad with its slotted tubes, permanently sealed with the new polyethylene bottom bar. More active material is exposed to the electrolyte . . . for greater power. More active material is retained . . . providing higher battery capacity for a longer working life.

Exide-Ironclad is Your Best Battery Buy . . . *AT ANY PRICE*

DEPENDABLE POWER

1888 . . . DEPENDABLE BATTERIES FOR 66 YEARS . . . 1954

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 2 • *Exide Batteries of Canada, Limited, Toronto*

"EXIDE-IRONCLAD" and "SILVIUM" *Reg. T.M. U.S. Pat. Off.*

TODAY, TO BE ABSOLUTELY

Sure

You Should Use

MAGNAGLO*

for Overhaul Inspection of Locomotives and Cars

Crack in diesel connecting rod revealed by MAGNAGLO as glowing indication.

Magnaglo can be used efficiently for all your important testing needs ...on precision diesel parts, traction motor shafts and gears . . . on truck, coupler, brake and frame members.

IT IS THE ONLY TEST THAT

- **Finds All Cracks in Any Part**
- **Detects Copper Penetration in Axles**

Non-visible-crack in car axle shows up unmistakably with MAGNAGLO.

With today's high speed diesels and cars, inspection during overhaul must find *every* defect, *every* time. The price of failure can be disaster!

That is why inspection with Magnaglo is mandatory in fully equipped shops. A broad improvement over Magnaflux Corporation's original dry powder inspection, Magnaglo locates defects which cannot be found by *any other means.* A typical example is copper penetration, a cause of sudden failure of axles.

Magnaglo is lowest in cost per part inspected of any engineered inspection process. Positive detection is assured—at lowest possible man hours—with equipment specially designed for railroad use.

Write today and we'll send you bulletins and reports showing how Magnaglo is insuring safer, lower cost inspection for leading railroads.

*MAGNAFLUX and MAGNAGLO are trademarks of the MAGNAFLUX CORPORATION

MAGNAFLUX

Reg. U. S. Pat. Off.

DETECTS DEFECTS

MAGNAFLUX CORPORATION
7320 W. Lawrence Avenue, Chicago 31, Illinois
New York 36 • Pittsburgh 36 • Cleveland 15 • Detroit 11
Dallas 9 • Los Angeles 58

One type of General Electric cable is used for the traction motor leads shown here, as well as for other power circuits, and, in smaller sizes and lower voltage rating, for control circuits.

You need just one type of G-E cable

for your diesel-electric locomotive rewiring program

One type of G-E diesel-electric locomotive cable can be used *size for size* to replace the worn-out general-purpose wiring in any locomotive. This cable is General Electric Versatol* Geoprene. It is available in sizes No. 14 Awg and larger with a 1000-volt rating for power circuits, and in sizes No. 16 and 14 Awg with a 300-volt rating for control circuits. The rating of the control cable is printed on the insulation for easy identification.

Versatol Geoprene cable has the toughness needed for power circuits

The neoprene-base jacket protects against flying dust, grit, and sand. It resists oils, water, cleaning compounds, live steam, and ice. The extra-flexible rope stranding is designed to withstand continual flexing. The insulation has excellent heat and moisture resistance to withstand severe operating conditions.

Versatol Geoprene has the easy-handling properties needed for control circuits

Fine stranding makes this cable flexible and easy to pull. The insulation strips cleanly for easy application of terminals. Uniform diameters simplify installation.

Simplify your stocking problems

Use this one type of G-E cable for all general-purpose rewiring. Special high-temperature cables are available for use in high heat areas. For more information, write Section W118-147, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

*Registered Trade-mark General Electric Company

You can put your confidence in—

GENERAL ELECTRIC

TAKING THE HEAT OFF....

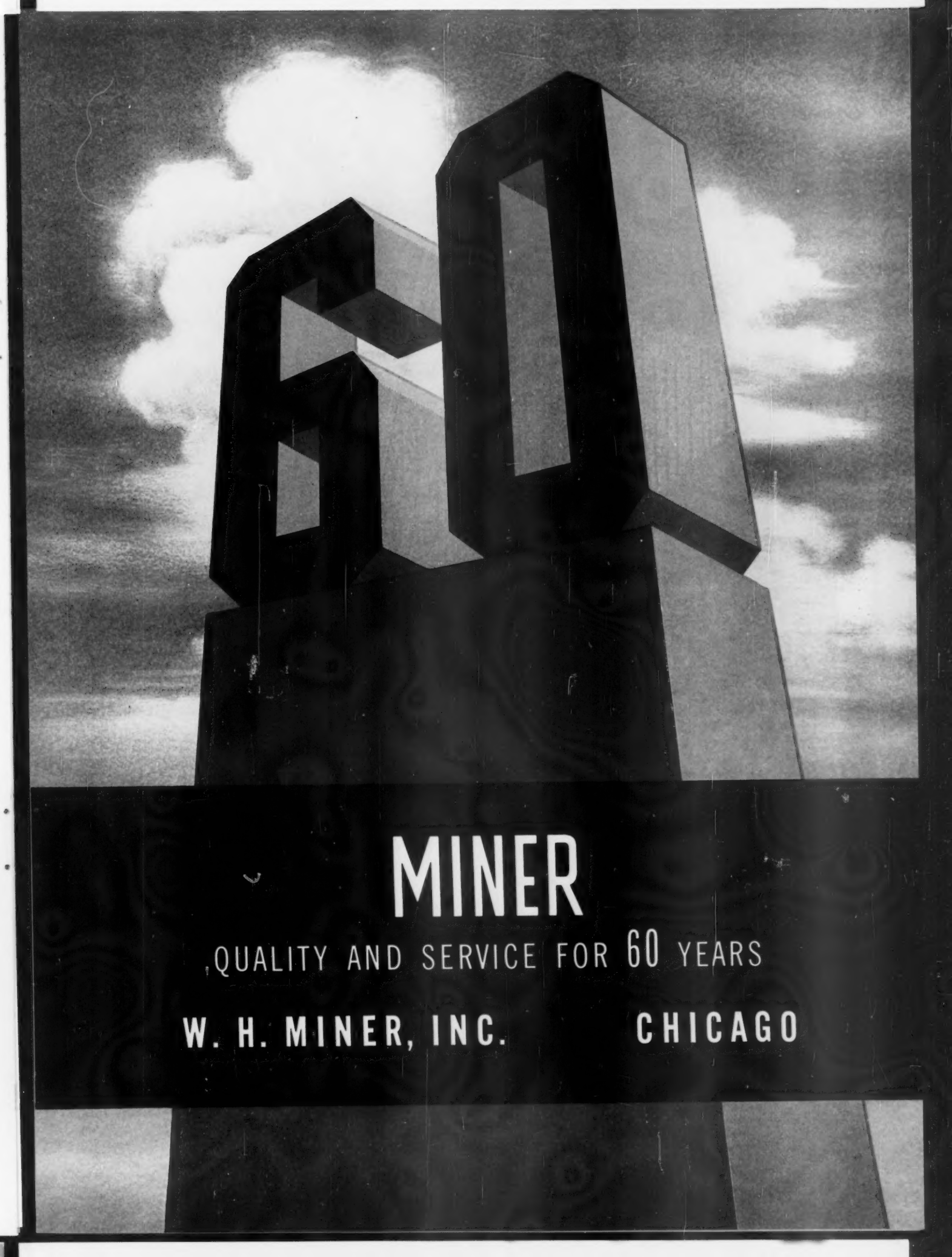
Bower-Franklin journal boxes, equipped with dependable Bower straight roller bearings, are ready to help you carry more freight — at greater speeds — with no danger of hot boxes.

These high-quality bearings have already *proved* themselves in numerous other types of heavy-duty equipment — steel rolling mills, heavy trucks, earthmovers, cranes, shovels, and railroad generator-drive units, to mention but a few.

Sales and application engineering for the Bower-Franklin journal boxes are being handled by the Franklin Balmar Corporation. Additional information will be furnished on request.

FRANKLIN BALMAR CORPORATION

FRANKLIN BALMAR CORPORATION
WOODBERRY, BALTIMORE 11, MARYLAND
CHICAGO OFFICE: 5001 North Wolcott Ave., Chicago 40


60
MINER
QUALITY AND SERVICE FOR 60 YEARS
W. H. MINER, INC.
CHICAGO

Dayton ENDLESS V-Belts solve power-interruption problem

1" BC-6 Endless V-Belt Axle Drive answers need of major railroad for constant, positive power

Here's how one railroad, working with Dayton Field Engineers, obtained more dependable power for air conditioning units and reduced belt drive maintenance and replacement costs at the same time.

THE PROBLEM —

A program to improve air conditioned passenger comfort was threatened by excessive belt breakage on under-car generator drives. The power demands placed on the belts using flat pulleys exceeded their maximum capacity. As a result, frequent service interruptions occurred, battery reserves were dissipated and increased yard recharging was necessary.

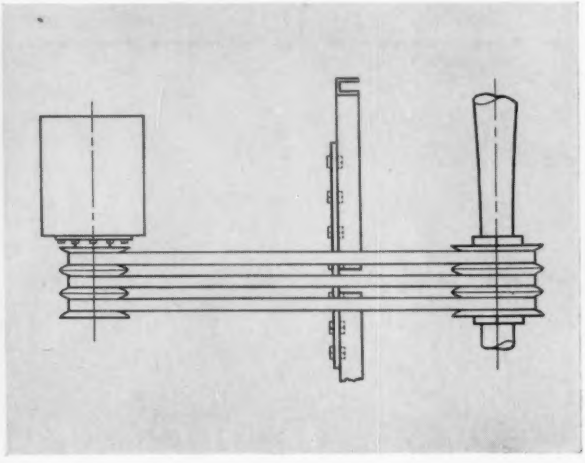
Exhaustive tests were made of several types of drives, but none proved entirely successful or economical. Dayton Field Engineers were then called in to discuss the problem.

THE SOLUTION —

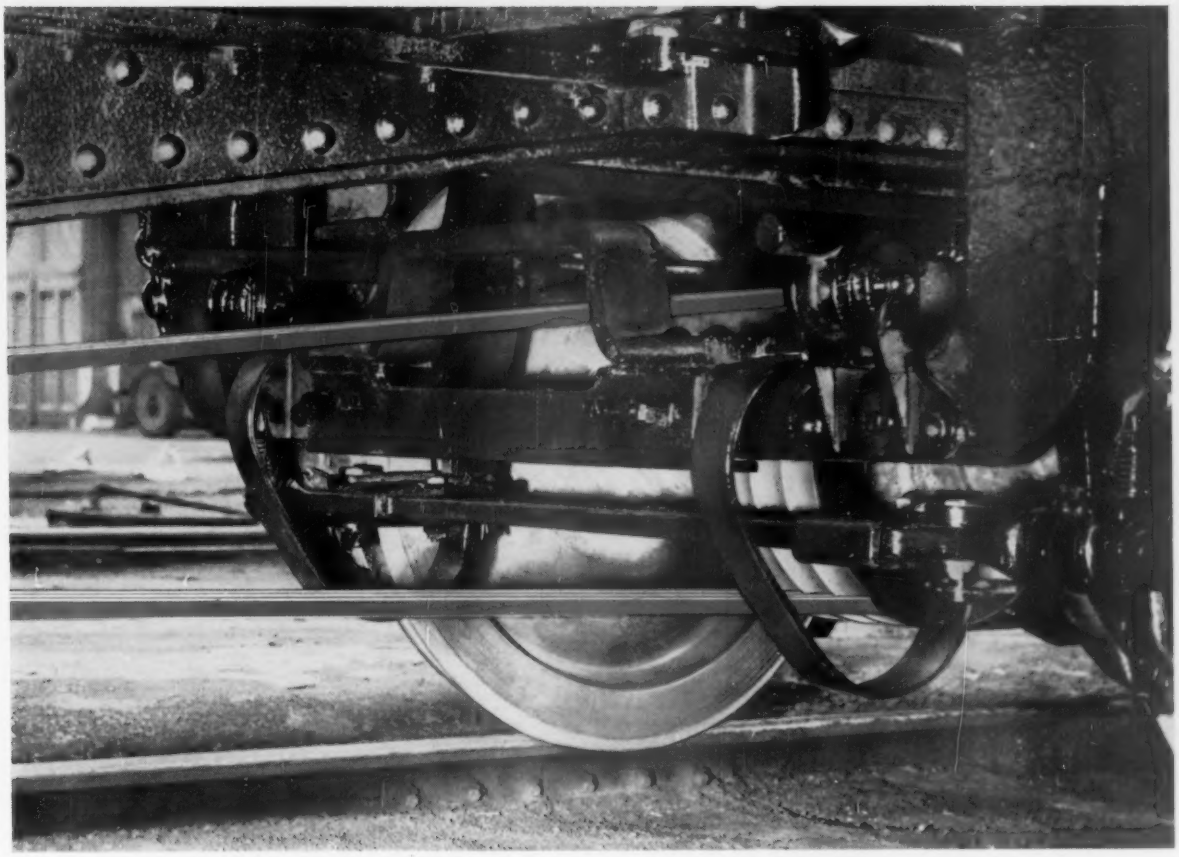
Dayton Field Engineers recommended replacement of all old style belt drives with 1" BC-6 Dayton Endless V-Belt drives.

Power supply improved at once! The harder gripping, longer lasting Dayton Endless V-Belts developed power to satisfy the heaviest demands of air conditioning units. Power interruptions were eliminated. Maintenance and replacement costs were drastically reduced. The rugged Dayton Endless V-Belts outlasted old style belts by 4 and 5 to 1 setting new records for dependable performance.

Completely Safe! Dayton's recommended procedure for cutting and splicing end-sill to accept Endless V-Belts has the written approval of the foremost builder of railway trucks.



Schematic diagram shows how end-sill is cut to accept Dayton Endless V-Belts. Note the minimum cut required and the manner in which the splice is made to reinforce the sill.



Dayton Endless V-Belts are easily replaced in axle drives. They outlast two and three wheel turnings. Changes can be made when trucks are down for normal wheel repair.

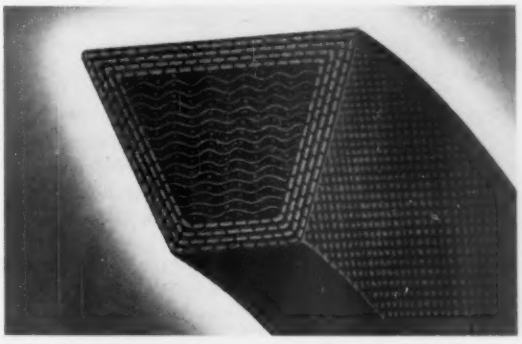
And, for added service protection, Dayton 1" Connector V-Belts can be used on interim replacement of Endless belts where damage has resulted from extraneous causes.

200,000 Miles of TROUBLE-FREE Performance

Dayton 1" BC-6 Endless V-Belts rolled up 200,000 miles of under-car service in the months that followed. So successful have they been that one large railroad has specified their installation on 63 new cars to be added to the line.

This is a typical example of how Dayton Field Engineers and Dayton Research lend a hand to the railway industry in the solution of its problems.

A call will place a Dayton Field Engineer at your service. Or write direct to: Dayton Rubber Co., Railway Division, Dept. 201, Dayton 1, Ohio.



Dayton Endless V-Belts are readily convertible to use with belt connectors for emergency applications.

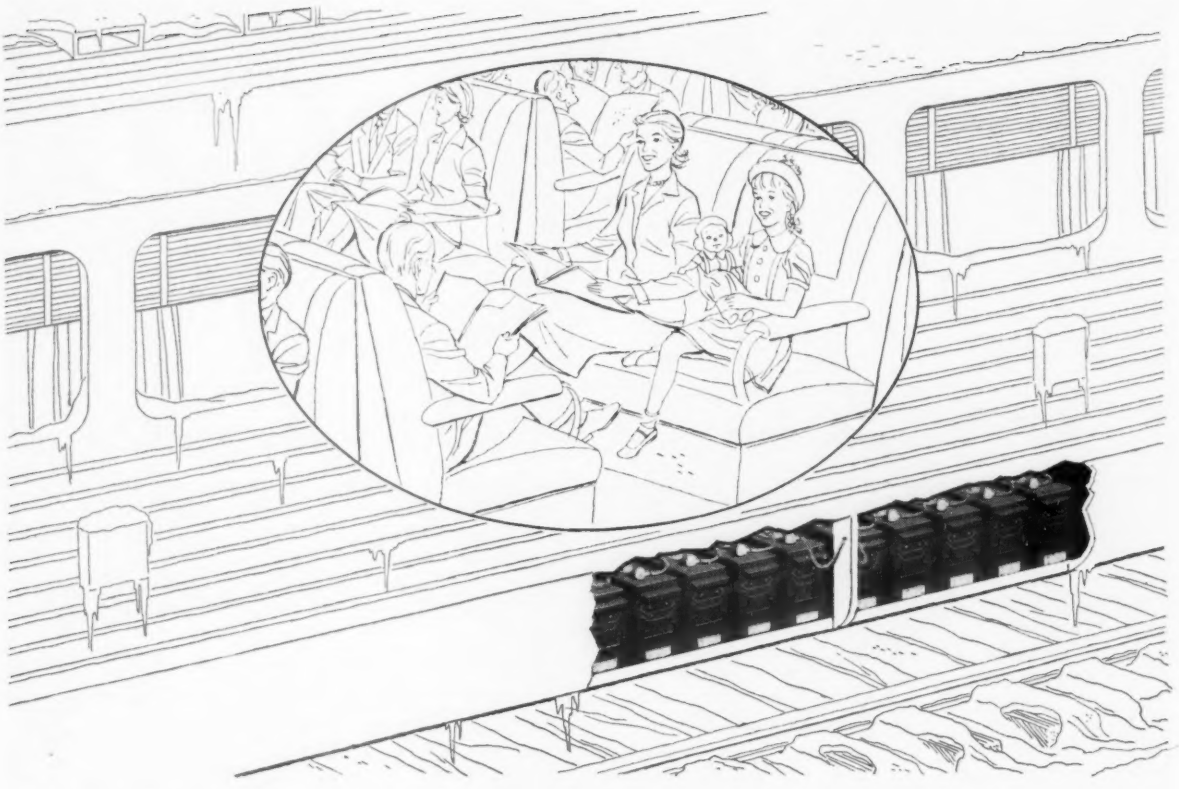
Railway V-Belts by

Dayton Rubber

Since 1905

World's Largest Manufacturer of V-Belts

DAYTON RUBBER CO., RAILWAY DIVISION, DAYTON 1, OHIO



Average Battery Life 23 Years
Average Winter Temperature 20° Below

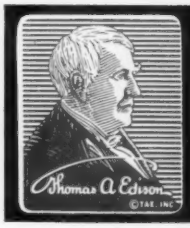
Frigid Winter Temperatures averaging 20 below—frequently 40 below and sometimes 55 below—do not hamper the Ontario Northland Railway in providing modern passenger service through the land of the fur traders as far north as Moosonee on James Bay.

Dependable Battery Performance has materially contributed to the successful operation of this road's passenger equipment under such adverse conditions—aided only by insulated, snowtight battery compartments and positive generator drives.

23 Years is the average life of EDISON batteries used by this road; two sets are in their 37th year of service. Then too, EDISON batteries that have completed normal service life are utilized for many extra years of service in baggage and combination cars.

Regardless of Conditions, EDISONS are the most dependable batteries you can install. Their extraordinary "long life" means lowest over-all cost. They can safely be kept in a high state of charge on the road, thus reducing the need for yard-charging. They successfully withstand the overcharging and overdischarging incidental to railway-car service. Complete facts on EDISON railroad batteries are available in Bulletin SB 3802. Write for your copy and the name of your nearest Edison field engineer today. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.

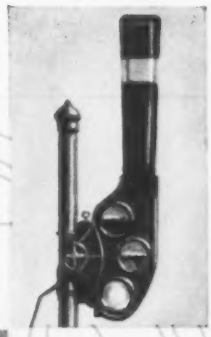
Most Dependable Power —
Lowest Over-all Cost
. . . you get <u>both</u> with an EDISON



EDISON
Nickel · Iron · Alkaline
STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V. P." VOICEWRITER AND THE TELEVOICE SYSTEM

Faster freight...safer freight



ON HYATT ROLLER BEARINGS

Here it comes! The semaphore flashes green . . . a fast freight rushes over the rails . . . and another colorful diesel reminds us that the railroads are rapidly modernizing. Actually, many railroads are already completely dieselized, and they're now investing many more millions in push-button freight yards, electronic signaling systems and automatic safety devices. But the *biggest* news in modernization is *Hyatt Roller Bearings for freight cars!* Standard for years on railroad passenger cars, roller bearings are the answer to a brighter future for freight—because *they eliminate the hot box problem*, greatest single cause of costly freight train delays. When *all* freight cars are Hyatt-equipped, they'll roll with greater speed, greater smoothness, greater economy and greater safety! Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

running mate of diesel freight!

HYATT

STRAIGHT BARREL TAPER

ROLLER BEARING JOURNAL BOXES

Where Does Self-Interest Lie?

Immediately after the beginning of hostilities in Korea, during the summer of 1950, the Class I railways, at a member meeting of the Association of American Railways, established a goal of 1,850,000 freight cars of Class I ownership to be attained by July 1953. At that time the Class I freight-car ownership was about 1,722,000. On July 1, 1953, it was 1,767,000. By the end of October it had increased to 1,775,000.

In December 1952, the date at which the goal was to have been attained was advanced to December 1954. To acquire an ownership of 1,850,000 freight cars by that time the Class I railways will have to receive about 150,000 new cars during 1954, of which half will be replacements if retirements continue at the 1953 rate. This will require the freight-car production facilities of the United States to turn out between 11,000 and 13,000 cars a month during 1954. As of November 1, there was a backlog of 35,000 undelivered freight cars on order. This is entirely too small a working margin to permit the carbuilding industry to produce at such a rate. It will have to be more than doubled before the attainment of such a rate becomes even remotely probable.

Two changes affecting the opinion of railways as to the need for more freight cars have taken place during the past year. One is the cessation of active hostilities in Korea. This and the reduction of emphasis at Washington on the need for pushing defense preparations have gone a long way toward eliminating national defense as a factor affecting car buying, notwithstanding the warning of James K. Knudson that punitive action might be taken by government agencies unless the railroads took immediate steps to attain the 1,850,000 car ownership goal.

The other change is the downward trend in carloadings during the last third of 1953. Car shortages were not acute during 1953 by comparison with those which were experienced during 1950 and 1951. Entirely aside from the threat that the government may inject itself into the situation, however, the railroads can ill afford to be complacent so long as there are persistent car shortages of any degree.

Any failure of service in the competitive situation in which the railroads now operate endangers the future of the industry. So far as the individual shipper is concerned, the railroads are no longer an essential service. Until railway men of all ranks and all departments realize this and act on the realization, errosion of railway traffic will continue at much too rapid a rate for the future safety of railway transportation.

EXTRA THOUSANDS OF MILES between Hot Box Set-Offs

YOU CAN improve your hot box record by using a *premium* car oil—one with extra load carrying capacity and oiliness characteristics—*Texaco Car Oil 1960.* As proof, let us show you the hot box records of leading railroads using this exceptional all-year lubricant.

Prepare now for the peak hot box months next summer. Let a Texaco representative give you the full story on premium *Texaco Car Oil 1960.*

Just call our nearest Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta; or write:

The Texas Company, *Railway Sales Department,* 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Railroad Lubricants
AND SYSTEMATIC ENGINEERING SERVICE

IN ALL 48 STATES

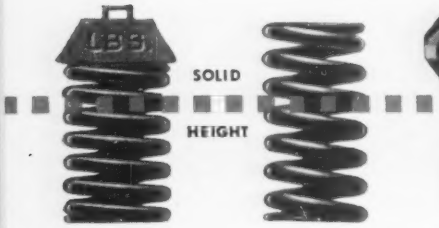
TUNE IN . . . METROPOLITAN OPERA radio broadcasts every Saturday afternoon. See newspaper for time and station.

They're making older

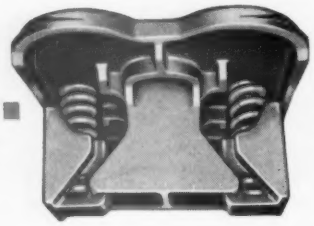
Santa Fe Reefer being brought up to modern riding standards. This car is one of thousands that have been equipped with smooth-riding ASF Ride Control Packages. Installation is simple: just jack up the bolster, pull all the old short-travel springs, slip in the Ride Control Package.

Why a small per-car investment in Ride Control Packages can pay you big returns

SMOOTH, SAFE RIDING AT SPEEDS TO 100 MPH



Long-travel springs . . . for soft, impact-absorbing spring action, whether the car is empty or fully loaded. Your choice of 2½" or 3" spring travel.

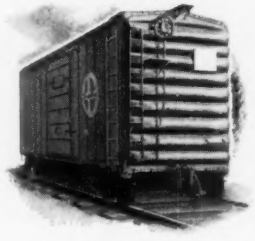


Constant friction control . . . prevents harmonic oscillation of springs. Induction-hardened friction surfaces *keep* it constant —for years of service.

FEWER LADING DAMAGE CLAIMS

The inevitable result of a smoother riding freight car is greater protection of lading —especially when running in modern speed ranges.

LOWER MAINTENANCE COSTS



The car that rides smoother is the car that requires less maintenance and fewer repairs. And, even the roadbed stands up longer!

On the Santa Fe, a continuous program of modernization adds weight to the slogan, "Ship Santa Fe all the way." Here's how

cars ride better than ever!

The Santa Fe repair program offers a good example of how older freight cars can be brought up to modern riding standards—at costs which are soon written off.

During scheduled repairs, the Santa Fe has equipped 4271 reefers and 983 50-ton box cars with ASF Ride Control® Packages, the self-contained units with built-in long-travel springs, *constantly controlled* by induction-hardened friction surfaces.

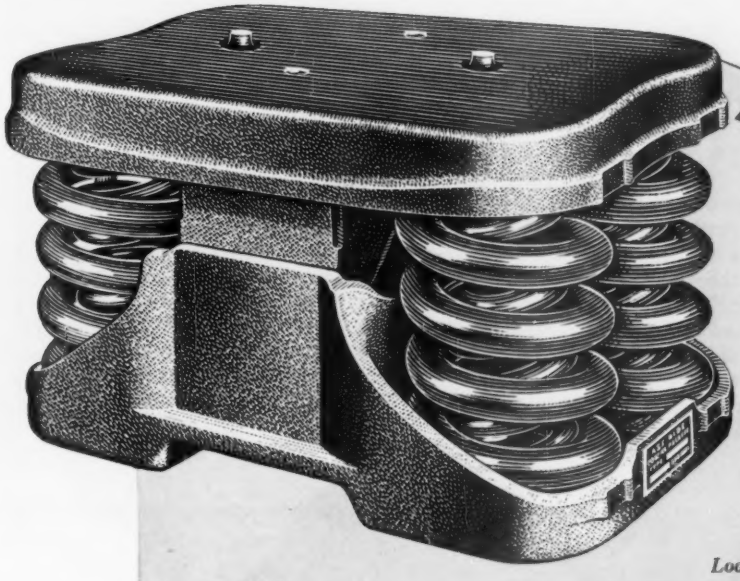
Standard procedure, as cars are shopped, is to first check the condition of the trucks. If side frames and bolsters don't meet AAR standards, they are replaced with ASF Ride Control Trucks. But in the thousands of cases where trucks are up to standard, the old short-travel spring groups are simply replaced with Ride Control Packages. Time required for the change: less than a half-hour.

Result? Cars that ride better than ever before. *Cars that cut lading claims and cost less to maintain.* In short, here's how a leading railroad is providing smoother, safer freight hauls. And, *repeat orders* for Ride Control Packages prove that the Santa Fe's modernization program is paying off.

Find out how Ride Control Packages can help you keep your older cars in first class condition—and cut lading claims as well. Your ASF Representative has facts and figures on the practicability of making *smoother riding* another objective of any general repairs program. Write us today!

Bring your older cars up to modern riding standards

with



ASF

RIDE-CONTROL PACKAGES

AMERICAN STEEL FOUNDRIES

410 N. Michigan Avenue, Chicago 11, Illinois

Look for this MINT ◯ MARK on the running gear you specify

Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

EDITORIALS

Ventilation—Key to Self-Maintenance

In the old steam locomotive shops, and particularly in the roundhouses, dirt was present in such quantity that new lighting fixtures became little more than markers after only a few weeks operation. Cleaning fixtures seemed a futile thing to do. There was nothing that could be called illumination, and workers had to develop a kind of dark-adaptation. In fact, if you couldn't see in the dark, it was generally regarded as a kind of personal disgrace.

The diesel locomotive has changed all that and some diesel shops now boast of 40, 50 and even 60 footcandles of illumination on the working plane. Of course, such innovations almost invariably introduce their own problems. The need for good lighting for the necessary precision work and cleanliness required has been definitely established, but producing that light requires a lot more lighting fixtures.

If the initial illumination is to be retained, fixtures must be kept clean, and there are now many more to wash. To be sure, they do not get dirty so quickly, but the neeed for keeping them clean is still there.

For the shop operator who looks upon fixture washing as an irksome and unproductive task, some new information is now available. Tests made over a period of two years and reported by Floyd W. Sell, of the Detroit Edison Company, in a recent issue of Illuminating Engineering, show that ventilated lighting fixtures will go a long way toward eliminating the need for cleaning. If the air in the fixture is kept in motion, the dirt just doesn't sit down.

Carefully controlled tests were made on unventilated and ventilated fixtures in Detroit Edison shops, where welding fumes and paint spray residue were present. After a year, the light output of the unventilated fixtures had decreased 28 per cent, while in the units with an open slot over the lamps, it had fallen off only 9 per cent. And that is still scarcely enough to make the average shop operator think about washing.

Additional information on this subject, including incandescent units, will appear in these pages.

What Work for The Outlying Shop?

Determining just how heavy a degree of work can be performed most economically at an outlying shop instead of at a central shop is primarily a question of balancing off the cost of the movement against the estimated savings from doing the work at the larger and presumably better equipped point. Yet there are other factors that must be taken into consideration. Perhaps no one of these secondary factors is important enough by itself to effect seriously the final decision on whether a given type of work should be handled at the shop in the locomotive's home territory or at the main back shop. But collectively they can be of sufficient consequence to throw the final decision one way or the other.

There are two points not usually given much consideration in favor of handling some of the moderately heavy overhaul work at outlying shops where other conditions, such as volume of work and equipment installed in the facility, are favorable. First is that doing overhaul work on the equipment they service gives the men a chance to become more familiar with it than where they seldom or never get the opportunity to look inside at the component parts. This tends to familiarize the mechanic, and keep him thoroughly familiarized with the details of an item of equipment and its principles of operation.

A second advantage in doing more of the heavier work at the outlying shop is that the master mechanic, or whoever is in charge, has a greater incentive to do the job right than the supervisor who does not see the equipment from one overhaul to the next. The man who does have to live with the equipment between overhauls will be more concerned with doing a first class job on the overhaul than the one who will be effected but little by the consequences of any short cuts or improper workmanship in the repair.

The objectives of either of the preceding considerations can of course be attained in other ways than by taking on heavier repair work at outlying points. Men can be familiarized and kept familiar with the equipment they service by continuing education. Which way will cost the railroads the least money? Which will do the better educational job? As to the incentive for doing a better job, will this be partially offset, completely offset, or more than offset by the better equipment that would be installed in the major back shop, and by the greater specialization to be found among the workers in the central shop?

The answers to these questions are intangible and difficult to measure in dollars and cents. They are not the most important factors involved in arriving at a decision on the division of work between central and outlying shops. But they are important enough to be considered in making major decisions on dividing the work.

Non-Destructive Testing

It would be difficult, if not impossible, to estimate how many lives and how much property value have been saved by the introduction and gradual extension of non-destructive test methods to railway equipment parts. Not only are defects discovered, for the most part, at the inspection points and repair shops, thus minimizing road failures, but analysis of the defects and surrounding conditions frequently suggest changes in mechanical design or operating practice, which still further reduce the likelihood of costly failures on line of road.

The question confronting railroad shop managements is whether or not they are: (1) using enough of the right kind of non-destructive test equipment; (2) following correct test procedures necessary for best results; (3) developing an adequate force of trained operators; (4) and, last, but not least, providing the supervision without which no test program, no matter how carefully developed, can be really successful.

As regards the amount of testing facilities required, one large railroad now has 56 test installations, mostly magnetic-particle, at 26 points on the system, and expects to utilize proportionately more of this type of equipment as additional diesel locomotives are placed in service. Experience seems to show that, while test principles and procedures are relatively simple and easy to understand, best results can be expected only when carefully instructed operators are working under proper supervision. It is also important for operators to have a clear idea not only of correct inspection techniques, but of the nature of expected defects, their location and possible causes.

The training procedure successfully followed on another railroad, when an inspection unit is installed, either new or transferred, is to send a railroad technical specialist and a manufacturer's representative to instruct the local supervisor and two mechanics on methods of operation. Verbal description and instruction booklets are supplemented by actual part inspection which, of course, must be repeated whenever an experienced operator is assigned to other duties and replaced by a new man. Shop supervision which depends entirely upon former operators to instruct new men is taking a chance that these instructions will be incomplete and result in inferior inspection.

Other conditions which obviously need to be guarded against are: leaving instruction booklets covered up on the foreman's desk; abuse of test equipment, and failure to furnish adequate supplies; shifting of responsibility for failure to find defects; use of short-cut test methods not proven over a period of time; failure to check operators for physical handicaps, especially poor vision.

NEW BOOKS

TEXTBOOK OF THE MATERIALS OF ENGINEERING. EIGHTH EDITION. *By Herbert F. Moore, research professor of engineering materials, Emeritus, Engineering Experiment Station, University of Illinois, and Mark B. Moore, associate professor of mechanical engineering, Rutgers University. Published by the McGraw-Hill Book Company, 330 West 42nd street, New York 36. 372 pages, 6¼ in. by 9¼ in. Price, $6.*

This textbook presents concisely the properties of various materials used for machine and structural parts which affect the strength, stiffness, ductility, and resistance to corrosion or wear. The coverage of these properties includes methods of production, such as casting, molding, etc., and chemical and mechanical methods of strengthening materials—heat treating, alloying, hammering and rolling, and aging. The internal structures and processes producing various materials are briefly described, and the effectiveness of various treatments for structural or machine parts demonstrated, also the limiting stress, strain, or strain energy under which various metals function satisfactorily. New material includes recent information given by the electron microscope, a slight discussion of resistance to "fatigue" by metals under compressive loads, discussions of Boron and Titanium, prestressed and air-entrained concrete, and new treatment on numerous plastics. A special feature is the use of the nomenclature for fatigue of metals recommended by the American Society for Testing Materials.

WELDABILITY OF STEELS. *By Robert D. Stout, Ph.D., professor of Metallurgy, Lehigh University, and W. D'Orville Doty, Ph.D., welding metallurgist, United States Steel Corporation. Published by the Welding Research Council, 29 West 39th street, New York 18. 381 pages, 6¼ in. by 9¼ in., cloth bound. Price, $6.50.*

This monograph covers briefly the fundamentals of welding processes and metallurgy; the basic factors which influence the weldability of carbon and low-alloy steels; and suggested methods for welding commonly used steels. Final chapters contain a review and critical evaluation of weldability tests and general conclusions on what is known of weldability. The book was prepared by the Welding Committee of the Welding Research Council and the members of the Subcommittee on Welding Projects of the American Iron and Steel Institute.

Some important *economic facts* about

LOW-COST SOLID BEARINGS

Here are some conservative estimates on the cost per car per year to maintain solid bearings . . . and some basic reasons why no return on an investment in non-standard bearings could be realized:

One The average annual net cost per car for all materials necessary to the maintenance of solid bearings, including oil and packing, amounts to only 2.62% of the current cost of installing expensive non-standard bearings.

Two Based on the number of packers and oilers required by one railroad whose miles-per-hot-box average for 1952 was 3 times the average for all Class I roads reporting to the AAR, the cost per car per year for this labor is only about 3% of the current cost of installing non-standard bearings.

Three All routine solid bearing maintenance costs come to less than the annual fixed charges (interest and depreciation) on the investment necessary to install non-standard bearings. Thus, when you take the high maintenance costs for non-standard bearings into consideration, it can be seen that solid-type bearings are by far the better buy.

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In any serious consideration of bearing economics, it must be remembered that the favorable returns claimed for high-cost non-standard bearings are neither realistic nor practically attainable in the foreseeable future. That's because:

1. Over 50% of the claimed savings are derived by including as costs for solid bearing operation the presumed loss of imaginary revenues that are in reality not available to the railroads.

2. The high cost of periodic disassembly, inspection and reassembly of non-standard bearings (in all probability far higher than comparable costs for solid-type bearings because more time, more skilled labor and more extensive shop facilities would be required) is completely ignored by their promoters.

3. The miles per failure for non-standard bearings is set at a figure several times the actual performance of such bearings in passenger service — where the bearings receive perferred (and costly) maintenance and where they carry far lighter unit loads in far less rigorous service.

4. The claimed savings for non-standard units are also essentially a *prospectus* — because their cost has been estimated at less than one fourth the current cost for comparable bearings on passenger equipment.

HOW TO LICK HOT BOXES

You can lick hot boxes best with low-cost solid bearing designs. Heat-resistant lining metals and low-cost alarms are already available. Improved lubricating methods are being developed. Combine these improvements with an intensified program to upgrade maintenance practices and hot box problems can be quickly overcome. Then too, you still retain all the inherent advantages of solid bearings — lighter weight, smoother riding quality, lowest accelerating and running resistance, highest load capacity, and many others.

Be sure you have the FACTS about low-cost solid bearings. Write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

Right for Railroads
...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Electro-Motive Announces Ten New Diesel Locomotive Models

Similar to previous models only in appearance, they offer greater power, plus many other features aimed at cutting both maintenance and operating costs.

One of the improvements in a new line of ten types of railroad motive power just announced by the Electro-Motive Division, General Motors Corporation, is an increase in propulsion power of a four-unit diesel freight locomotive from 6,000 to 7,000 hp. This is 1,600 more than the horsepower rating of the first U. S. diesel freight locomotive, brought out by Electro-Motive in 1940, and reflects technological advance in GM diesels over a period of 13 years.

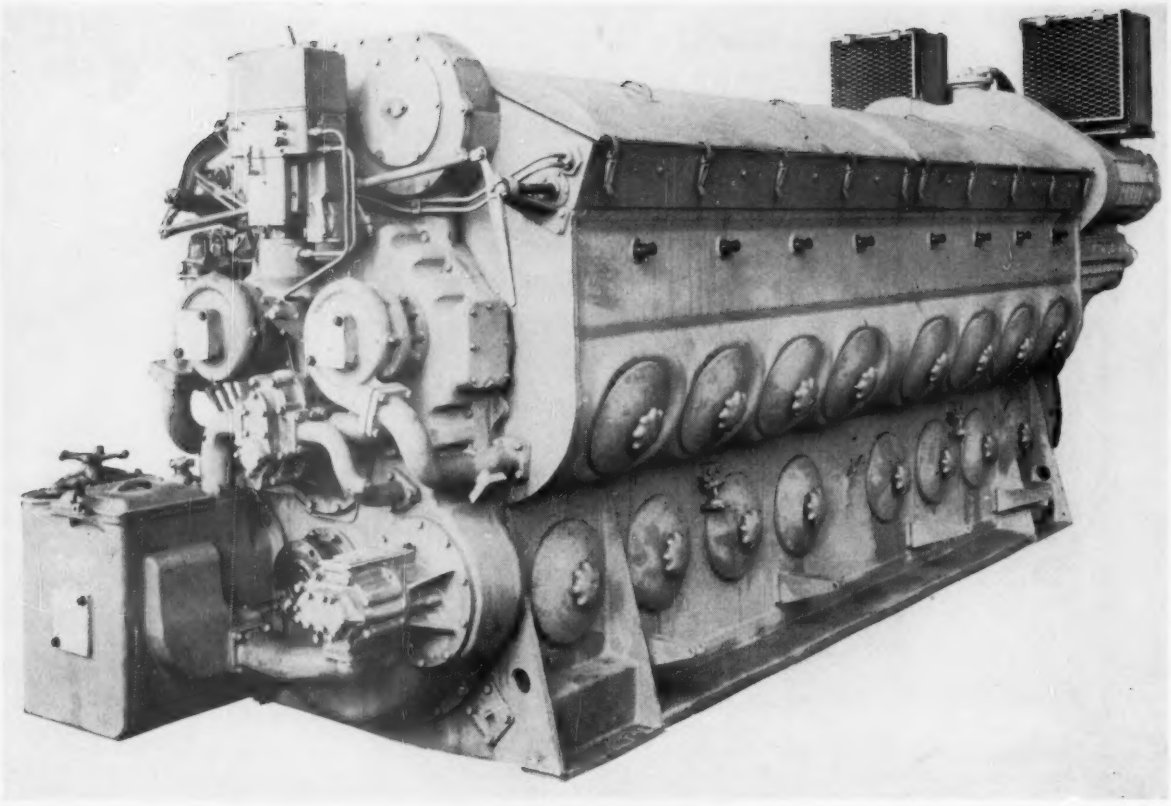
Most of the increases in ratings or in service life stem from the introduction of a new General Motors diesel engine, the 567C series, upon which Electro-Motive engineers have been working for five years, and from a new traction motor which has been so improved that it has made possible the elimination of arbitrary short time ratings for all models and all gear ratios.

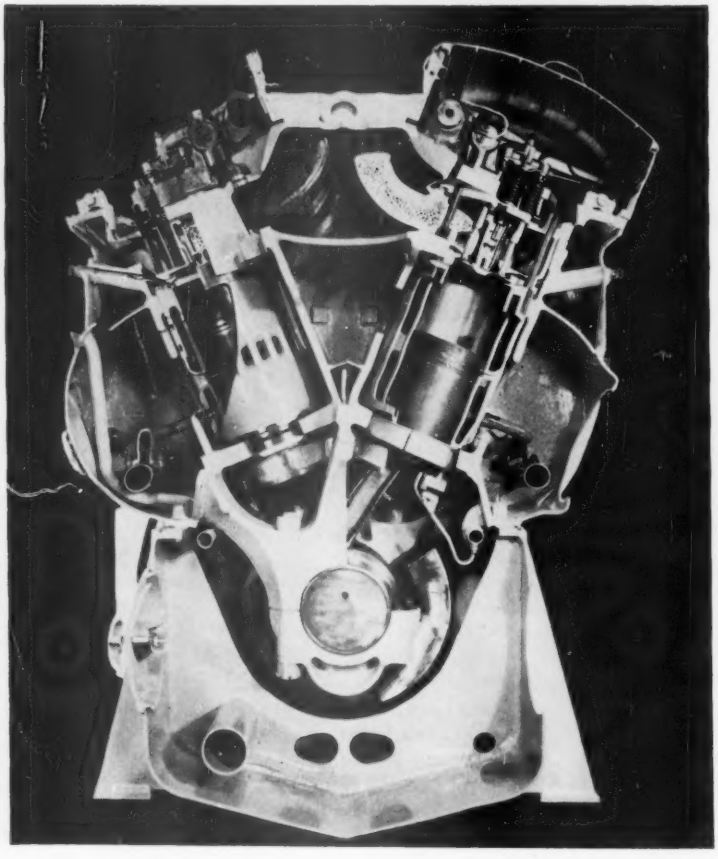
Deliveries of the ten types of new locomotives from EMD plants in LaGrange, Ill., and Cleveland, will begin in January, 1954, N. C. Dezendorf, vice-president of General Motors and general manager of Electro-Motive Division announced. Each new model is marked by upgrading of its capabilities over those of the current models.

The new models are the result of development projects continuously carried on at Electro-Motive with the objective of improving performance, lengthening the life of locomotives and reducing maintenance costs. The new traction motors, with the higher ratings of the new 567C diesel engine, make it possible to haul more tons or haul the same tonnage faster.

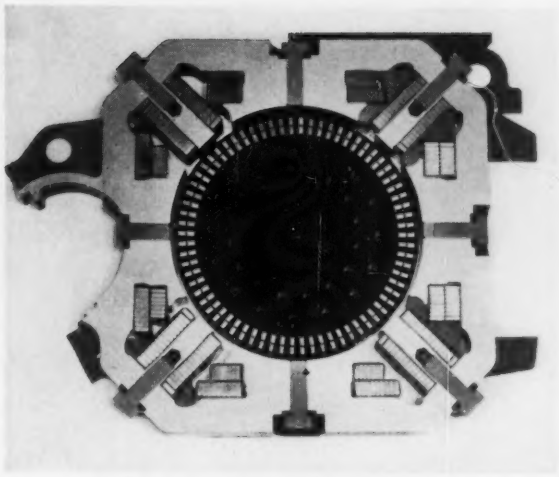
Other Improvements

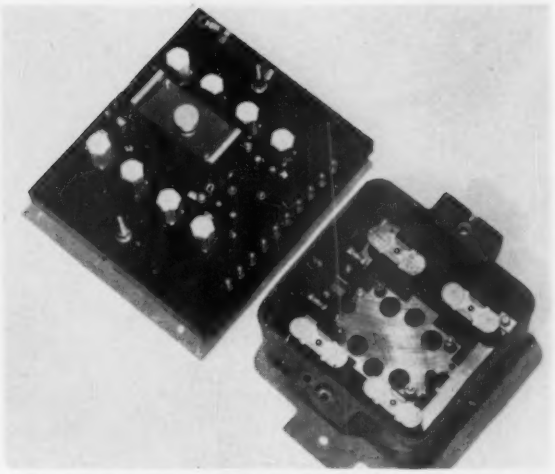
Other major improvements in the new locomotives include a new sealed gear case with a newly-developed





The new 567 C Series diesel engine, a 1,750 hp., 16-cylinder unit of which is shown above has a number of improvements many of which can be applied to previous 567 series engines. Highlights include an entirely new crankcase design with heavier frame members and lower stress levels; new hinged and latched top deck covers; a heavier cover frame that encloses fuel lines to provide them a warmer location; newly developed cylinder heads and liners; replaceable water inlet manifold jumper lines instead of large water seals on cylinder liners and heads; new trunnion rod and piston carrier that provides more effective lubrication; new handhole covers with leak-tight seals; and screw-secured exhaust manifold caps. Although the weight of the new engine is slightly greater than previous models, there has been no increase in its size.





Left—Composite cross section model of D-27 traction motor showing field coils at the lower left and of the D-37 motor field coils at the upper right; right—The new motor field shunting contactor using a new alloy for contact material is one-third the size of the old contactor

stable lubricant said to give up to ten times the previous lubricant performance. Test runs with this gear case have been made on western railroads for over a year in heavy service without loss or addition of lubricant.

Electrical control apparatus has been greatly simplified through the use of newly-developed contact materials and more direct mechanical motions eliminating joints, bearings, complicated linkages and flexible shunts. The new controls are designed for six-year maintenance-free operation.

The complicated motions of the present interlocks and control apparatus have been eliminated in the new equipment in which the new contact materials are utilized. The new materials permit the making and breaking of contacts with a simple, direct motion, instead of the rocking motion necessary in presently available control apparatus.

The new contact materials are utilized in the totally enclosed electrical interlocks, generator shunt field contactor, generator battery field contactor, battery charging contactor, traction motor shunting contactor, starting contactor, and in the complete line of auxiliary relays.

Although the new controls are smaller, because of a substantial reduction in the number of parts, and thus inherently cheaper, they are completely interchangeable with present devices.

New wheel slip control and automatic sanding equipment has been designed to utilize effectively the greater horsepower and tractive force. New engine cooling capacity and new brake rigging stabilizer are other outstanding features. Air compressor capacity has been increased from 178 to 235 cu. ft. per min. displacement by increasing compressor speed from 800 to 835 r.p.m.

Developed initially on the General Motors SD-7, six-motor special duty locomotive, the wheel slip control involves a current sensitive wheel creep device, working on differential current, that detects conditions that would lead to a wheel slip. It then applies sand automatically to the rail for a predetermined time interval.

If the control provided by this device and automatic sanding are not enough to prevent the wheel slip, then another current-sensitive device recognizes the conditions existing and works to modulate horsepower until stable adhesion conditions have been re-established, after which horsepower is reapplied at a controlled rate. All of this is done *automatically* for the locomotive engineman.

NEW MODEL GM DIESELS AND THEIR MAJOR IMPROVEMENTS

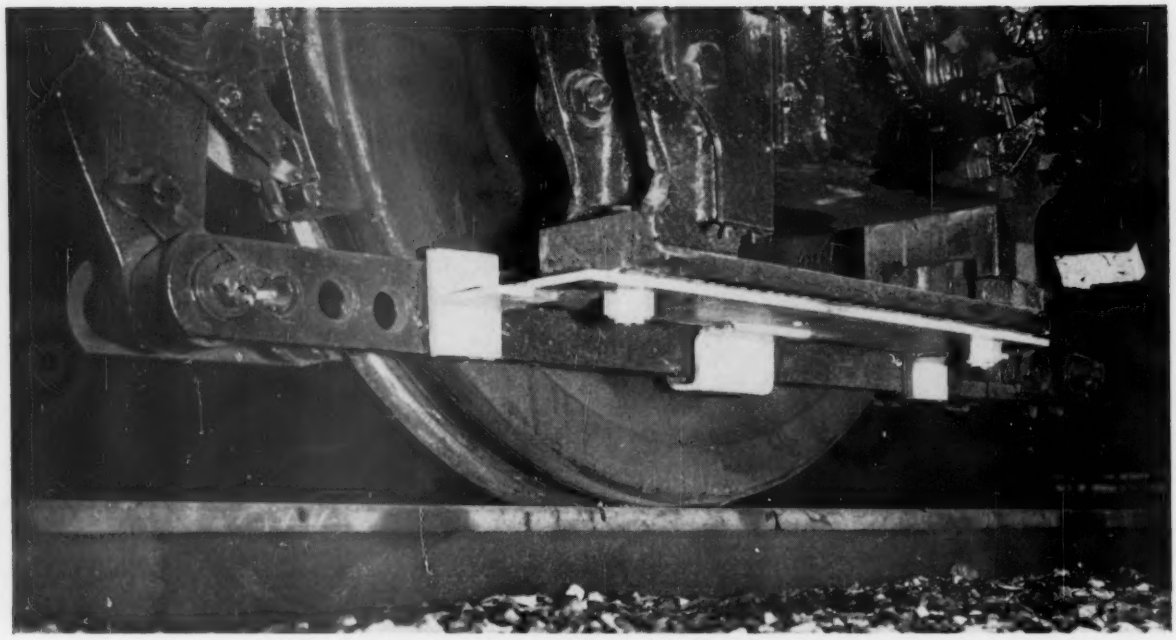
F9 freight*—Increased from 1,500 to 1,750 hp. per unit.
FP9 freight-passenger—Increased from 1,500 to 1,750 hp. per unit.
GP9 general-purpose—Increased from 1,500 to 1,750 hp.
SD9 special-duty—Increased from 1,500 to 1,750 hp.
E9 high-speed passenger—Increased from 2,250 to 2,400 hp. per unit.
SW 600-hp. yard switcher—Increased life of components.
SW 900-hp. yard switcher—Increased from 800 hp.; more durable parts.
SW 1,200-hp. yard switcher—Increased life of components.
TR9 transfer—Increased from 1,600 to 1,800 hp.
TR12 transfer—2,400 hp.; increased life of components.

* Or heavy-duty passenger

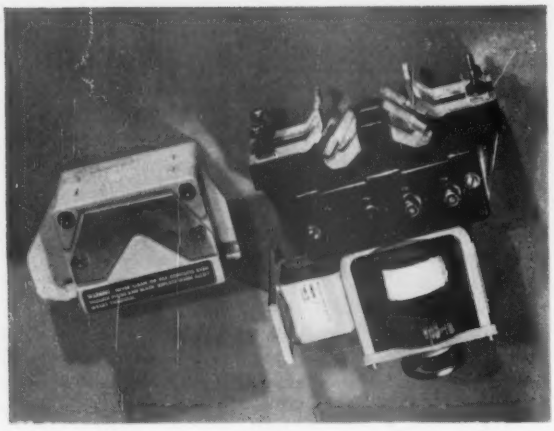
In meeting the problem of a high speed wheel slip in passenger service, it was necessary to develop an electrical control device that would retain its sensitivity over a greater speed range. The new General Motors E9 locomotive has such a device, in addition to the low speed, heavy drag type of wheel slip control. The device for controlling high speed types of wheel slips re-calibrates itself to maintain a constant sensitivity, when the traction motors are operating in parallel rather than in series. Run-away wheel slips are detected, horsepower is reduced and then re-established at a controlled rate to suit conditions—all automatically.

The 567C Diesel Engine

The new engine in the 16-cylinder version provides 1,750 hp. for propulsion. Its maximum speed is 835 r.p.m. as compared with 800 r.p.m. for its predecessor. Its size has not been increased. This 16-cylinder engine powers the F9, FP9, GP9, and SD9 models. The engine in all sizes (6, 8, 12 and 16 cylinders) has an entirely new crankcase designed for longer service life. Frame members are heavier and the stress level of the entire crankcase is reduced, in spite of the higher horsepower output. Large water seals on cylinder liners and heads are eliminated through the use of replaceable water inlet manifold jumper lines, individually connected to new-type liners and heads. Stress plates no longer are subject to



Lateral play in the linkage of clasp brakes is prevented by this rigging stabilizer



New battery field contactor simplified through the use of a newly developed contact material is less than half the size of the former contactor

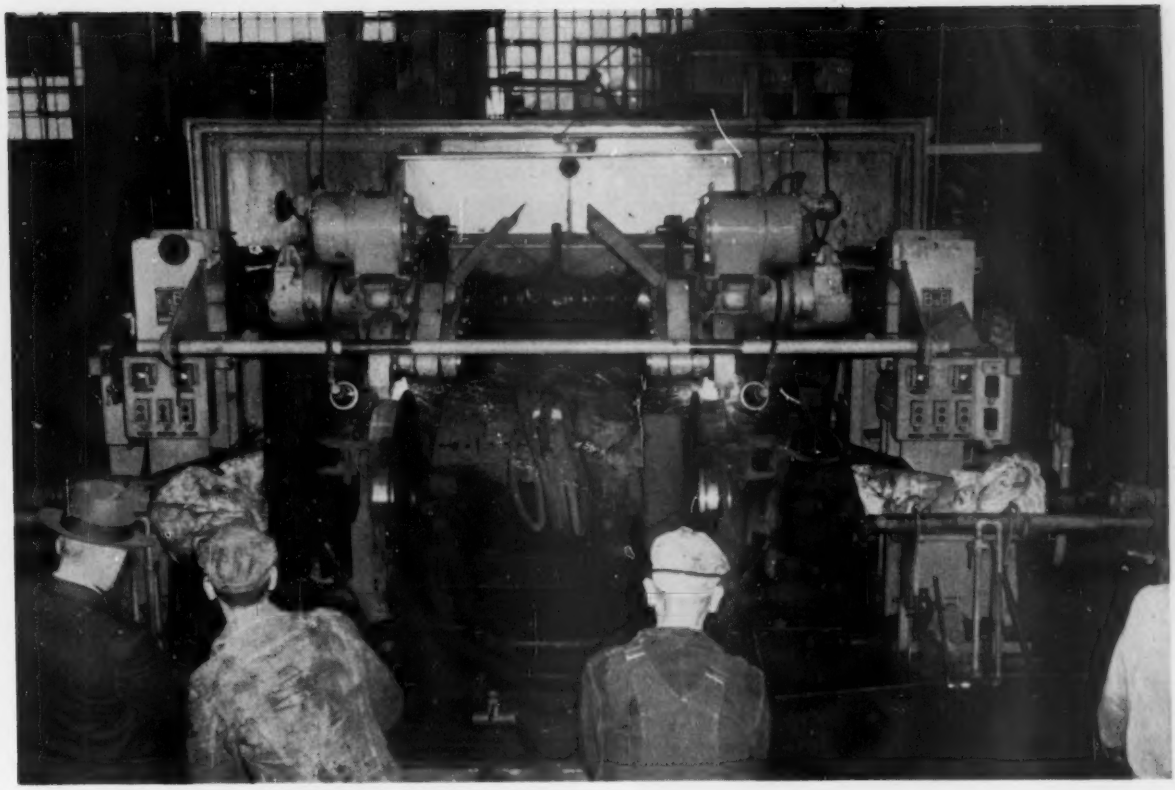
Field coils are moisture-proofed by molded silicon rubber insulation

corrosion by water. New and small synthetic seals are used and a new replaceable wear ring for the lower liner pilot takes wear off this integral part of the crankcase. The engine incorporates high output injectors and improved cylinder head cooling.

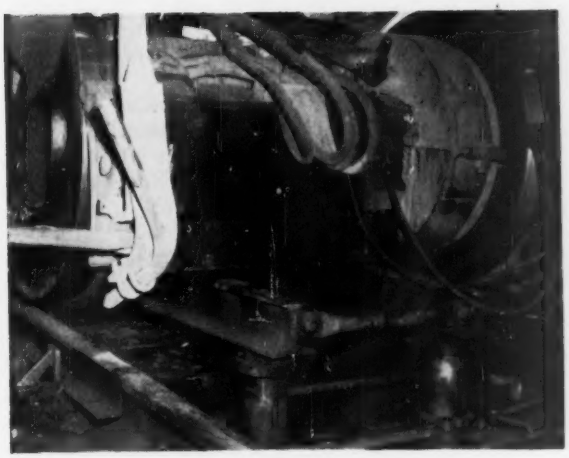
Traction Motor Improvements

A new molded coil which seals out moisture permits a substantial increase in traction motor ratings with the elimination of arbitrary short time ratings. Along with the improvements in electrical performance and mechanical reliability of the field coils, mica in the armature coil pad has been entirely replaced with Teflon, the new insulating material, which reduces chafing because of its low coefficient of friction. With these developments both the stator and the armature of the new motor can operate at higher ratings with lower temperatures than its predecessor. This means longer life and less maintenance. The new motor also incorporates the recently developed sealed lubricant armature bearings and a new molded polyester glass-insulated brush holder designed to withstand flashovers without damage.

In the new locomotives where the higher horsepower capacity of the 16-cylinder, 567C engine is utilized, engine cooling capacity is increased. Six-inch radiator cores instead of 4-in. cores are used on the F9, FP9, GP9 and SD9. In the SW9 and TR9 models, cooling fan speed is increased. A larger oil cooler with a 14-fin core replacing the 10-fin core formerly used is installed in F9, GP9 and SD9 units to give increased oil cooling.



Wheels Maintained Exclusively by Grinding

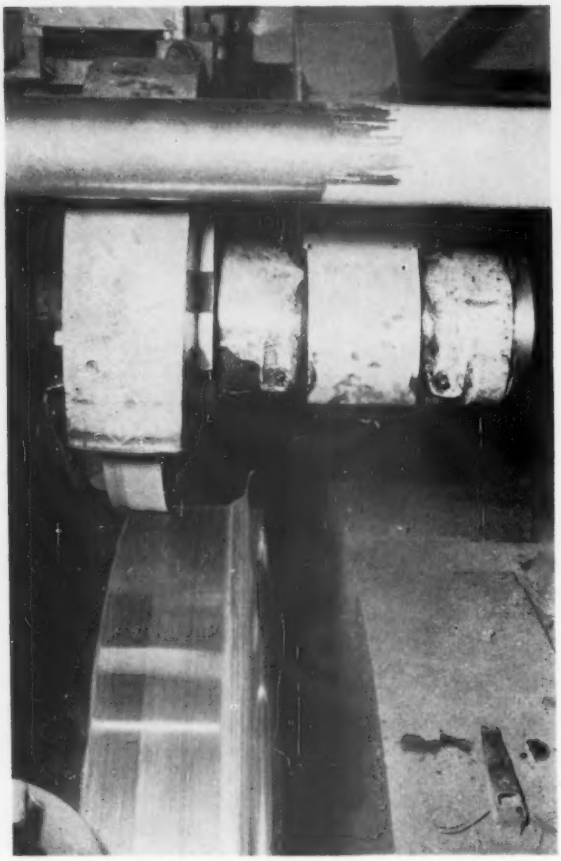


1. The truck is motored onto the machine by a traction motor, and the end raised to clear the rails . . .

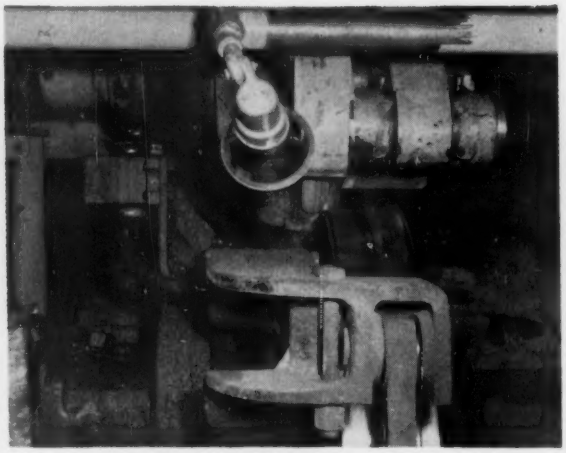
ALL wheel work on the 53 diesel switcher units of the Belt Railway of Chicago is handled by one machinist and an apprentice working one shift per day, five days per week. This work is done on a wheel grinder which can restore the tread contour to wheels in place on the truck (but not when the truck is under the locomotive), or to a mounted pair removed from the truck. The Belt does not feel that the inability to grind wheels in place under the locomotive is a serious handicap for a shop of its size with the maintenance procedures set up.

The work is done on a wheel grinder built by the B\&B Manufacturing Company, St. Louis. This machine restores both the tread and the flange contour on the two pairs of wheels in one truck during an eight-hour shift. It can also be made to grind passenger car wheels in place on the truck (including the center set on six-wheel trucks) and mounted cast iron wheels to insure concentricity. Other work that the machine can handle or be adapted to handle is grinding journals, suspension bearing surfaces on

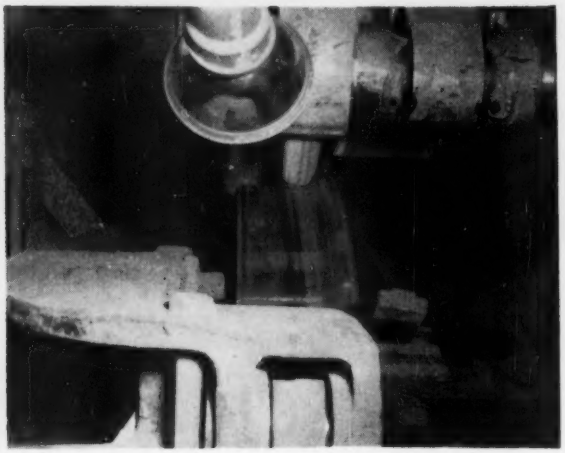
2. and to line up the ends of the axle horizontally with the live centers of the machine.



3. The wheels are rotated by the traction motor and the treads ground from the flange outward, including . . .



4. rounding off the outside edges of the wheel. These steps put a fillet on the stone, which has been . . .



5. found by experience to be about right for grinding the flange throat radius.

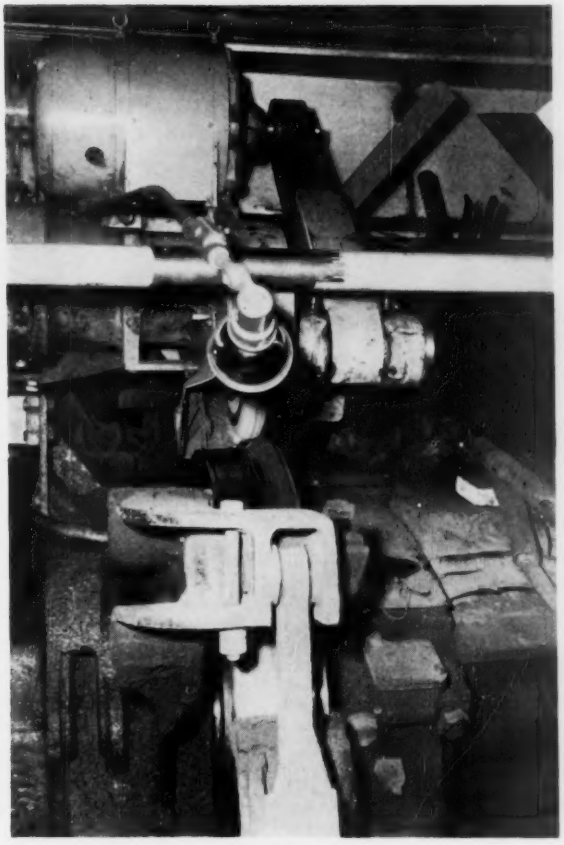
axles, and any type wheels from 29 in. to 72 in. in diameter—standard, narrow or broad gage.

The time between grindings goes as high as 18 months (90,000 miles over largely switching trackage) with an average of 14 months. This wheel life despite much of the operation occurring in industrial and other yards with extremely sharp curvature is partially due to the use of grinding and partially to two other factors: (1) the use of Nathan force-feed lubricators on front and rear wheels, and (2) regular reversal of the pair of trucks on the turntable. Wheel life is expected to be increased from four years to five, partially because less metal has to be removed by the grinding operation than is the case when turning is the practice as hard spots do not have to be undercut.

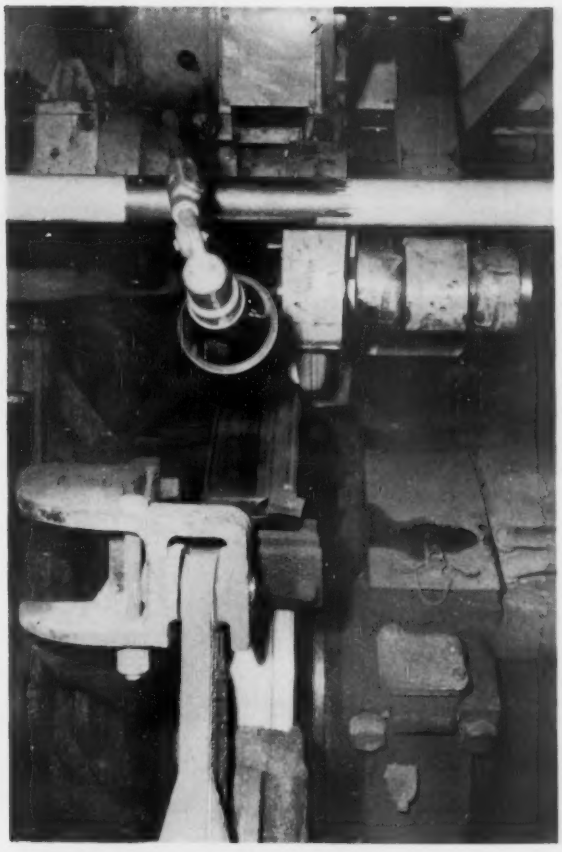
Both wheels are re-contoured simultaneously by two grinding wheels, 2 in. by 14 in. costing $38.50 per pair. No dressing or other maintenance of the wheels is required as each pair is discarded after grinding the four wheels on one truck. The only maintenance of any consequence required on the machine itself is on the belts, and that is because they are deliberately fitted loose so they will slip if the grinding wheel is fed too hard into the work.

Steps in the Operation

Wheel work is scheduled on the basis of advance study and written records of each locomotive ahead of the dates the unit is due for semi-annual or annual inspection. The unit is placed on the wheel grinder track between midnight and 8 a.m. of the date it is to get wheel work, and



6. The feed cannot crowd the wheel as the flange is ground from top down, causing the stone to move away . . .



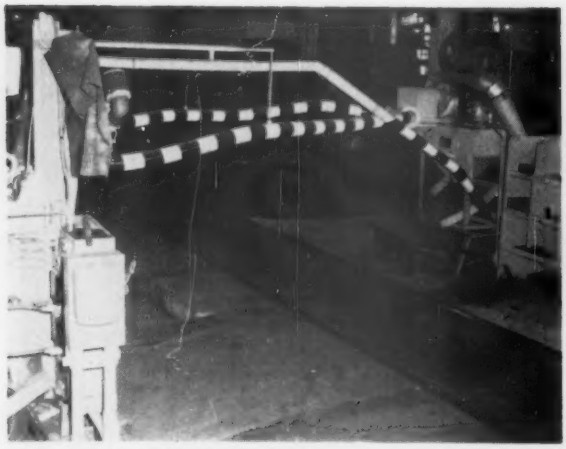
7. from the work unless the operator takes positive action to keep the stone in contact with the wheel.

one truck disconnected by the third-trick men. The unit is lifted out of the way by the overhead crane, and the truck is motored into the grinder. Movement into the grinder is by the truck's own traction motors with current furnished by a special circuit built into the machine. The same circuit also furnishes power to the traction motors to turn the wheels during the grinding operation. (Non-traction wheel sets are driven by a separate motor on the machine through a rubber tire.)

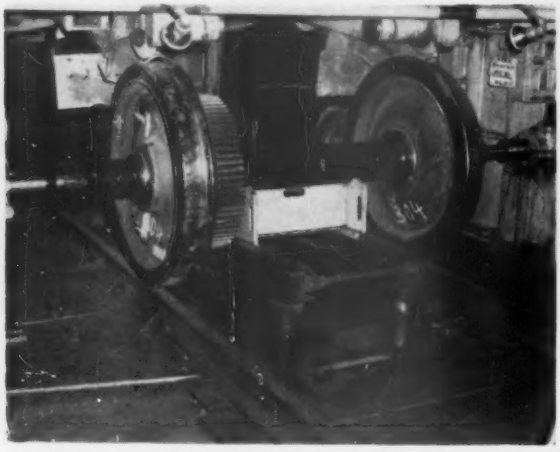
As the truck passes through the machine the last wheel set is brought to a stop when in line with the centers of the machine. An air valve is turned on and two 50-ton air jacks raise the end of the truck and its wheels two or three inches off the rail to line the axle up horizontally with the machine centers. When the wheel set is aligned to the centers, the centers are run into the axles by air power and the traction motors connected for revolving the wheels at 40 to 50 r.p.m.

The grinding wheels are hydraulically controlled from a portable remote station which is placed at a convenient point near the end of the truck with the operators facing the machine. The treads are ground down simultaneously to the new required diameter as pre-determined by a flange finger gage. This gage tells the operator how many sixteenths of metal must come off the tread to restore

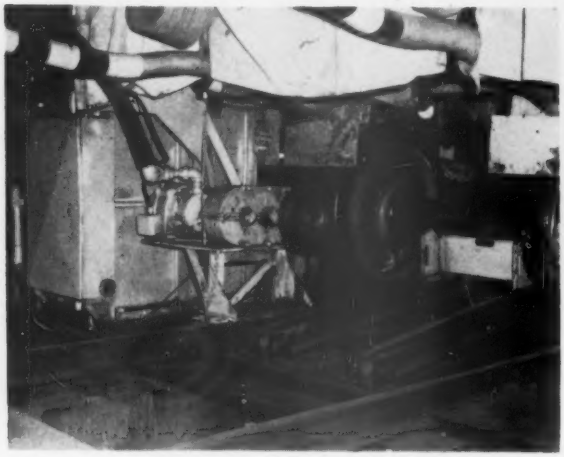
8. This depth gage is pre-set before grinding starts to tell the operator when he has removed enough tread metal.



9. All dust from the dry grinding operations is removed by this exhaust system and discharged outdoors.

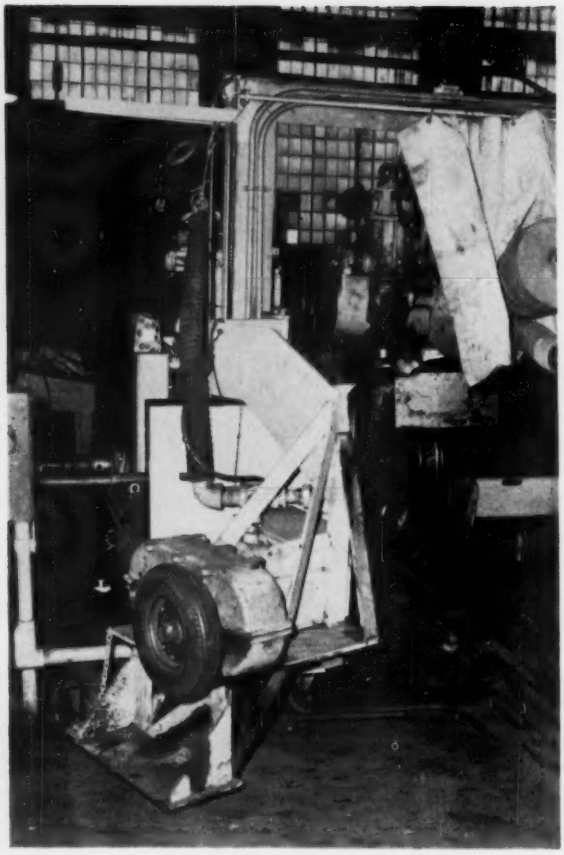


10. Wheel sets removed from the truck are raised and centered the same way as those in place on the truck . . .

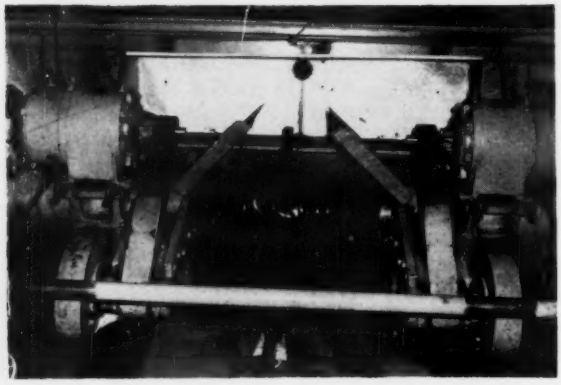


11. and are driven by an electric motor through a small rubber tire against the tread.

the flange to the required contour. Both wheels are brought to the same diameter by a sliding finger which moves across the machine.



12. This motor and drive is hinged and swings clear of the machine for admitting a truck.



13. Maintenance work on the machine is chiefly renewing belts, purposely fit loose to slip if stone is crowded.

When all tread work is completed the flanges are ground down on the top to be one inch in height, then rounded off to proper radius inside and out, and finally the outside of the tread is rounded off. A witness groove is left in one wheel not to exceed AAR limits. The flanges are reported by the inspector when worn to within $\frac{1}{8}$ in. above the 15/16-in. limit gage. The second pair of wheels is handled in the same manner as the first pair, and the truck is motored back to the proper place for reapplication under the body.

Contouring the Flange

Grinding the tread results in a radius forming on the inside of the stone. Experience has shown that the radius so formed on the stone is satisfactory for the flange throat radius. It is formed on the stone by the shoulders on the flange side of the tread, which result from removing successive layers of metal by grinding away from the flange. When the stone radius becomes too great, the wheel is "dressed" by taking a few cuts off the top of the flange.

Down-feed of the stone into the wheel is hydraulically operated and push-button controlled from the remote station. The average feed per stroke is about .009 in. The push-button control also permits accurate contouring of the flange; an operator becomes expert in this in from three to four months.

Contouring the flange is a safe operation because it requires positive action on the part of the operator to keep the stone in contact with the wheel. Grinding is done from the top of the flange on down. As the machine feed moves the stone from the flange outward, the operator must continually feed it downward into the wheel to follow the slope. If he fails to do this, no harm is done as the stone merely loses contact with the wheel.

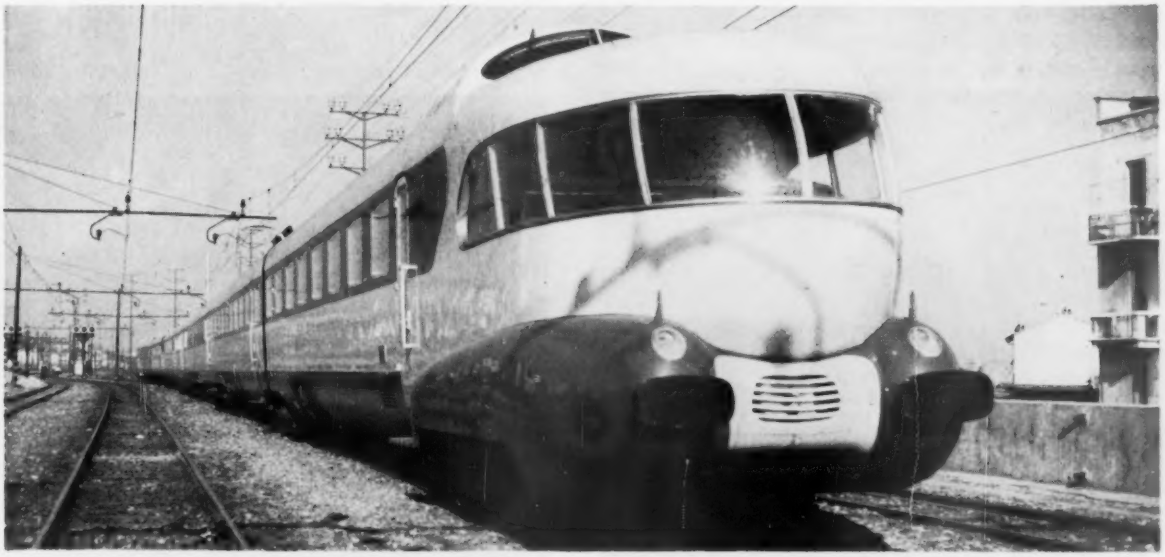
While the two pairs of wheels are being ground, the two men who formerly took wheel sets out of the truck make the general locomotive inspection and do required work. The wheels on the other truck will be scheduled for grinding the next time the locomotive is in for periodic work, consistent of course with the condition of the wheels.

Other Uses of the Machine

In addition to cleaning the wheels while they are rotating in the machine centers, commutator work on the traction motors and traction motor bearing testing is done. The traction motor speed, about four times the 40 or 50 r.p.m. of the wheels, is quite satisfactory for the running check of the bearings. The wheels are cleaned with an emulsifying agent and a brush while rotating, and this is done prior to grinding each wheel set. A pan on either side of the rail drains the cleaning agent and removed dirt and grease into the pit. A convex cover spans the gap between the pans and directs the liquid into them.

The one machinist assigned to all wheel work handles, in addition to the grinding, all boring of tires and shrinking them on wheel centers, boring and mounting new wheels, and turning and machining axle surfaces on new and used axles. He does this on the 53 switchers owned by the Belt and does an approximately equal volume of work on locomotives from various industries served by the railroad.

Future plans call for using this machine as a surface grinder on hard-faced materials to a tolerance of .001 in. This will require little work other than building a table as the machine has its own hydraulic control system. With the table to be built, it will be able to handle material up to 3 ft. in length and 16 in. in width. The machine can also be equipped with an automatic contouring arrangement which will cause it to follow the complete tread and flange contour without attention. Machines so equipped are presently in service at several steel companies.



An M-U electric train, Series 300, operating on the electrified line of the Italian State Railways between Naples and Milan. The train, built by the Societa Italiana Ernesto Bredo at Milan, is air-conditioned and consists of seven coach units with accommodations for 160 passengers. The two units at each end of the train and the three middle units are articulated, the three vehicles thus created being carried on ten four-wheel trucks. There are two operator compartments, each raised above the observation compartments at both the front and rear ends. The train is 541 ft. 4 in. long, 9 ft. 2 in. wide inside, and has a total weight of 714,000 lb. Each of the twelve motors (two in each of six trucks) which propel the train develops 265 hp. at the hourly rating and 200 hp. continuous rating. The maximum speed is 112 m.p.h.

The inspector feels of the journal with bare fingers to determine if it is running above normal temperature.

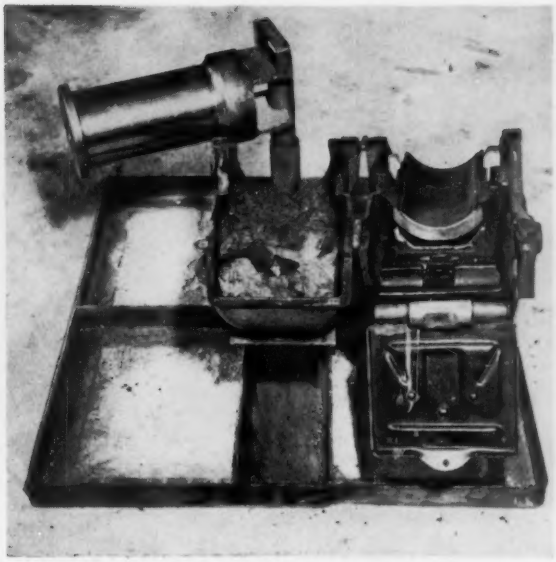
Waste grabs and accumulations of lint may contribute to hot boxes, so the packing is loosened with a hook.

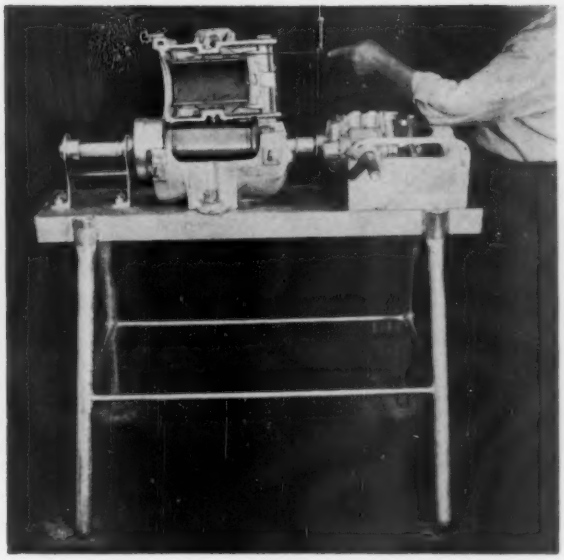
Just Another Hot Box . . . ?

Such an attitude on the part of any road contributes to a poor hot-box record. On the N&W every hot box is a reason for a searching investigation

Setting up the packing after removing the waste retainer.

Replacing the waste retainer in the journal box.





Special journal boxes for instruction and training in proper methods of packing boxes. A demonstration of how waste grabs develop and the proper method of hooking along the edge of the bearing (right).

THE Norfolk & Western does not take the attitude that a hot box is "Just another hot box." It has learned that one way to keep the number of hot boxes down to a minimum is to make a prompt and thorough investigation of each one that occurs. Today, almost as much concern is created and as thorough an investigation made of each hot box as was made 25 years ago for a derailment. From the general superintendent motive power, down to the inspector who last felt the journal, missing no one who was in any way responsible, the investigation is carried on. Gone are the days when a hot box could be brushed off by a simple report, "Due to waste grab."

Not only does each master mechanic always know how his division compares with other divisions, but a healthy rivalry exists all the way down to the inspection groups. Any inspector who has gone for a year or more, without having a hot box charged to him, has a right to be proud, and he usually is.

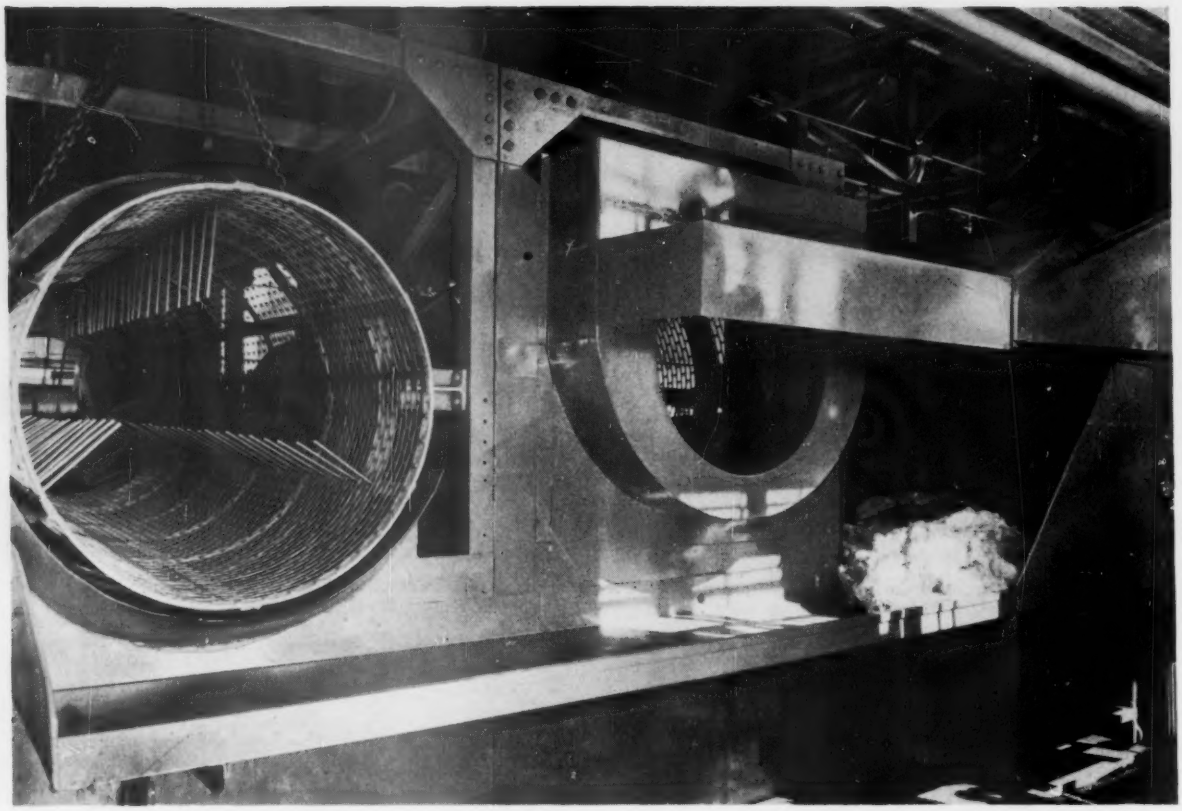
When a hot box develops, the dispatcher notifies the division master mechanic by telephone, who in turn telephones in the information to the office of the general superintendent motive power. Each morning, a bulletin is furnished each member of the general superintendent motive power staff that has a direct interest in hot boxes. This bulletin gives the record for the preceding day, the accumulated number by divisions, for the present and preceding month, and also the accumulated number of home owned and foreign cars for the month.

The master mechanic of the division, on which the hot box develops, furnishes a complete detailed report of pertinent information concerning the condition of the hot box and his conclusion as to its cause. The master mechanic of the division on which the car was last inspected includes in his report the time of arrival of train in yard, time inspection was started and completed, attention given the box and the name of the inspector servicing the box and the supervisor in charge. If the supervisor of the group inspecting the train was absent at the time, an explanation is furnished.

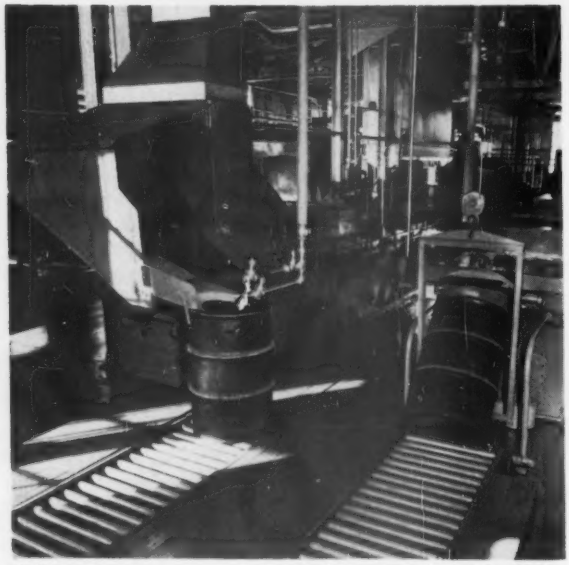
There has been a considerable difference of opinion on various railroads as to whether it is better to make inspection of boxes on arrival, or just prior to departure. Except in special cases, it is not practical to make two inspections. On the basis that the primary object of the inspection is to locate boxes in which conditions are such that they may develop into hot boxes, the N&W makes the inspection on the arrival of trains in the transportation yards. At that time, any unusual condition is readily evident by an increase in the running temperature of the journal. Abnormal conditions are more evident by a journal running above normal temperature than they are by visual box inspection after the journal has cooled.

On numerous occasions, the investigations of hot boxes have developed that conditions were such that the last previous inspection was not made until several hours after the arrival of the train. Evidence has been found in many hot boxes that the development of the hot box occurred over a rather long period of time. The box had been "sick" for perhaps several previous inspection points, but in each case the temperature had not been taken until the journal had cooled down. If the temperature at some terminal had been taken immediately on arrival, the "sick box" could have been corrected and would not have caused a hot box. For this reason, considerable emphasis is placed on making the inspection as quickly as possible on arrival, comparing the temperature of all journals on the side of each car.

At one location where the repair tracks are adjacent to a hump classification yard, a second inspection of several time freight trains, consisting primarily of foreign cars, the majority of which do not have waste retainers, is made just prior to departure for the purpose



Old packing is dumped into and travels through a hot oil bath. Mixed reclaimed and new waste passes through hot clean oil and is placed in drums (left).



Old waste, after removal of short ends, knots and foreign matter, is dumped on a table where new and reclaimed waste are mixed and both put through a revolving drum which discharges into the bath of hot clean oil.

of setting up packing that was disturbed in making up the train.

In making the inbound inspection, the procedure followed is that of feeling the journal with the bare hand, hooking the journal and setting up the packing in all boxes not equipped with retainers. If necessary, the packing in boxes equipped with retainers is set up after removing the retainer. The retainer is inspected while it is out of the box and if it is not in good condition, it is renewed. Free oil is added, if required.

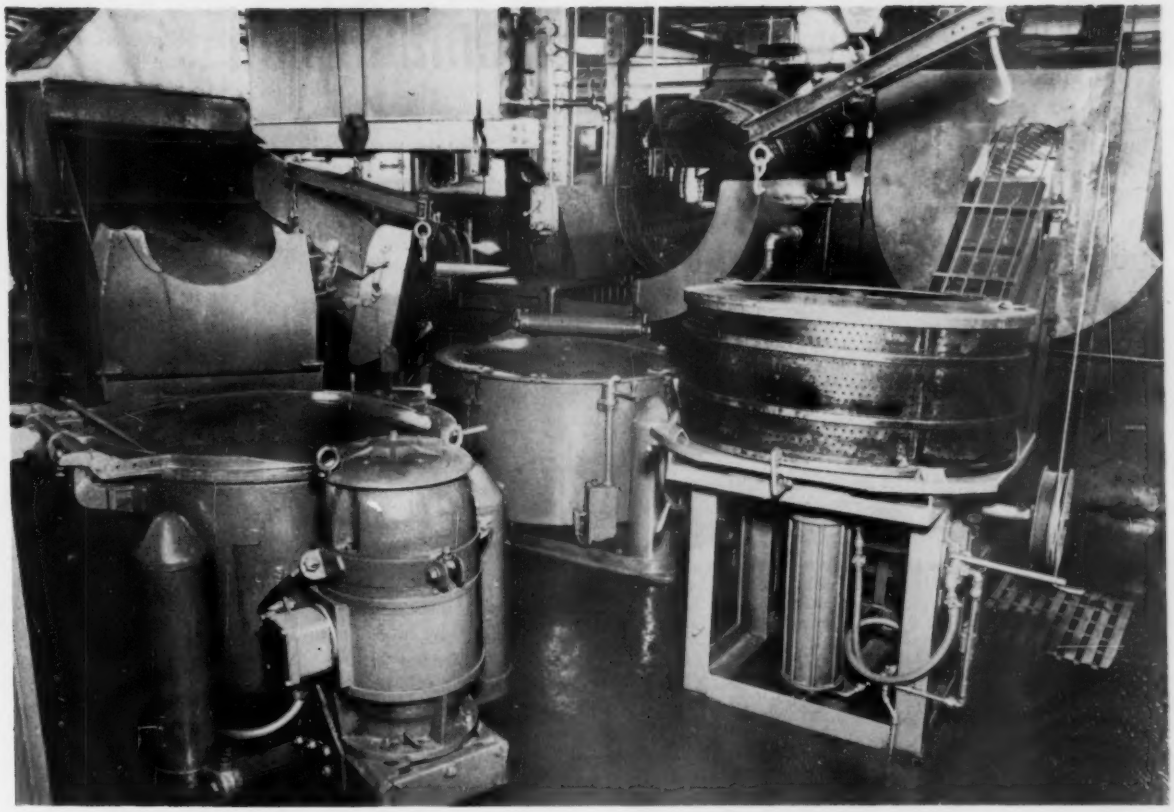
When the journal is found running above normal temperature, it is given the necessary attention at the point of inspection in the transportation yard, or shopped out of the train.

Inspectors are trained to recognize and correct conditions that may cause a hot box. Each is furnished with detailed instructions, in booklet form, describing each operation to be followed to prevent hot boxes on line of road. Newly assigned workmen first study these instructions and work with experienced men before being assigned to work alone.

Separate instructions, also in booklet form, are furnished each supervisor, outlining the general supervision of repacking boxes, inspection and investigation of hot boxes and defining his responsibilities therewith.

In addition to the furnishing of printed detailed instructions, for both workmen and supervisors, there is a frequent follow up by local mechanical officers of the work being performed, as well as by representatives from the office of general superintendent motive power.

Each major point is provided with special journal boxes for the instruction and training in proper procedures. Not only new men, but also those with experience, are required at stated intervals to demonstrate the packing of boxes, application of retainers and the hooking for waste grabs and spread lining. One design of



The old packing leaves the hot oil bath (upper left) and, after the oil has been extracted, is carried by a conveyor to a revolving drum (upper right background).

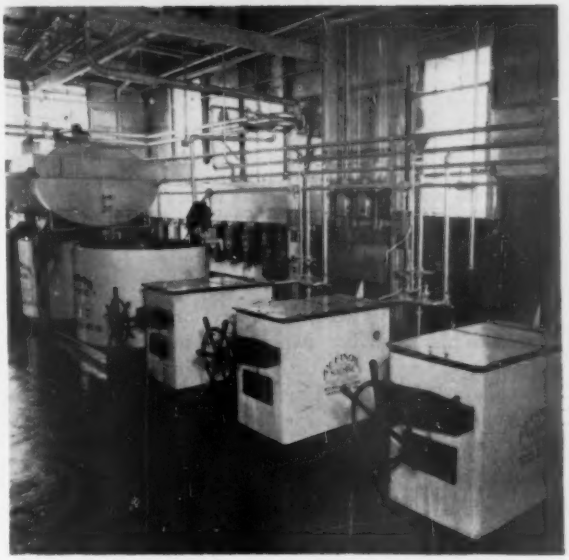
demonstration box has a journal that may be rotated with the bearing and wedge and packing in place. The box is cut in half and hinged so that the upper portion may be raised in demonstrating how waste grabs develop and the proper method of hooking along the edge of the bearing.

The N&W reclamation plant is located at Portsmouth, Ohio. All reclamation and preparation of packing for the system is handled at that point. It has been found that one of the major factors in reducing hot boxes is a good quality of packing. The reclamation of the secondhand waste and oil going into the packing is carefully controlled. The means employed for maintaining the quality of the waste and oil, both new and reclaimed, have been discussed in the previous article.

A typical 12-month production for the plant is as follows:

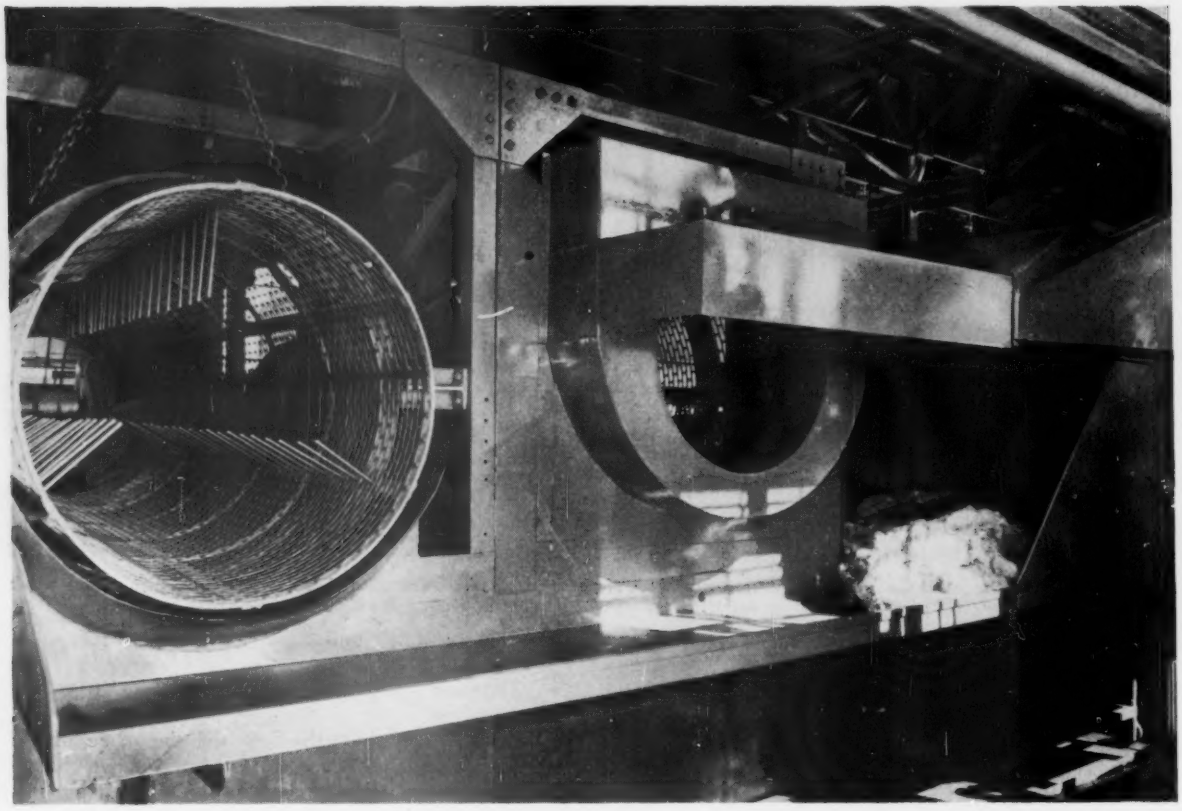
Reclaimed waste, lb.	625,432	
New waste, lb.	562,801	
Reclaimed oil, lb.	2,381,460	(315,008 gal.)
New oil, lb.	2,965,591	(392,274 gal.)
Total, lb.	6,535,284	

While the N&W has been able to make an improvement in its hot box record, it is not at all satisfied and is continuing to search for better materials and methods. At the present time, efforts are being made to find some means better than the conventional waste pack for delivering the oil to the journal. Waste packs of various materials in different forms are first run on a full size journal testing machine in the laboratory and the ones that show promise are then tested on the road.



After the old packing has passed through the hot oil bath, the oil from the tanks is reclaimed by means of this equipment.

It is realized that conditions are not the same on any two roads, but it is hoped at least some of the things the N&W has done to improve its hot box record may be of assistance to other railroads.



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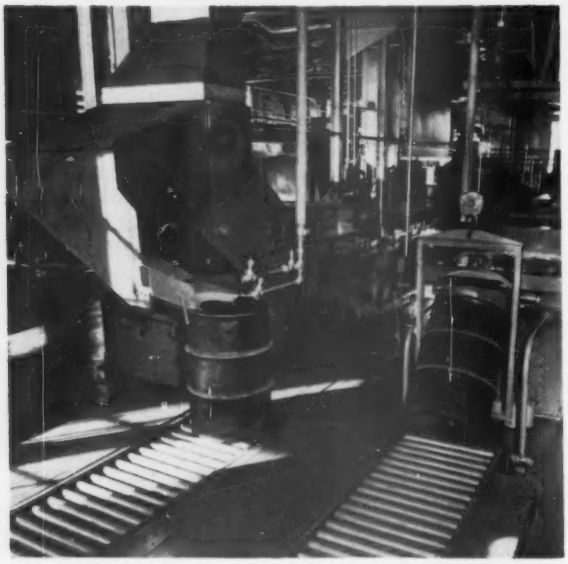

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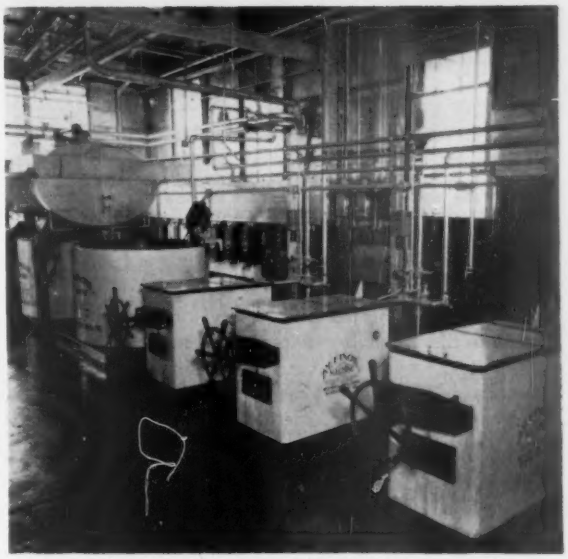

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Lehigh Valley Applies Premachined Ring Carriers

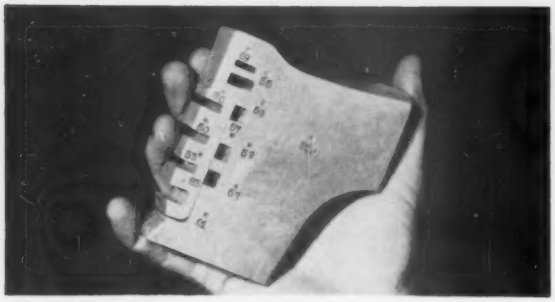


Fig. 1—This Alco 9-in. piston has been welded at the ring grooves, and graphically illustrates the loss of Brinell hardness on the wearing surface due to this method. The Brinell above the weld is 80 and below the weld it is 83. In the welded area itself the Brinell has dropped to 50 and 53.

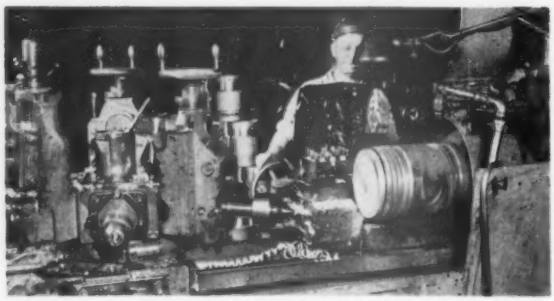


Fig. 2—In the ring carrier application method, the piston is first placed on a lathe and the old ring carrier turned off. Then .020 in. is taken off the piston itself from shoulder to crown to insure a good smooth fit for the new carrier.

[Mr. A. B. Birney, welding supervisor, Lehigh Valley, presented the following paper, covering the repair of worn ring grooves on Alco aluminum pistons, at the September, 1953, annual meeting of the Master Boiler Makers' Association at Chicago. This paper was presented as part of the discussion of the M.B.M.A.'s report on the welding of diesel locomotive parts (See Page 53, December, 1953 issue).—EDITOR]

SINCE November, 1952, the Lehigh Valley has been using a new method of repairing worn ring grooves on Alco 9-in. by 10½-in. and 12½-in. by 13-in. aluminum pistons. This new method employs a premachined ring carrier which is shrunk on the piston after the old carrier has been turned off. The ring carrier, in the case of the 9-in. by 10½-in. piston, is then welded to the piston at the crown, and the piston returned to service. In the case of the 12½-in. by 13-in. solid aluminum piston, no welding is required.

On the basis of results so far, we feel that this new method of rebanding aluminum pistons is much more satisfactory than the old method of welding worn carriers and remachining them on the piston. The Lehigh Valley was one of the pioneers in the method of repairing pistons by welding and remachining, and we have had some success with it with both the solid 12½-in. by 13-in. Alco aluminum piston and the oil-cooled 9-in. by 10½-in. Alco aluminum piston. But we felt that a better method for repairing ring carriers could, and should be developed.

Fig. 3—The new ring carriers are supplied completely pre-machined. These carriers are for Alco 9-in. pistons.

The welding and remachining of ring carriers on aluminum pistons was unsatisfactory for several reasons. First, on the 9-in. by 10½-in. oil-cooled piston, there was the possibility that the oil-cooling grooves in back of the ring carrier would be partially or completely sealed by the weld. In that case, the piston could not be expected to give satisfactory service. As there was no way to ascertain whether the weld on the ring carrier had sealed the oil grooves, we were put in the position of installing pistons in engines without knowing whether or not they were fit for long service. On the 12½-in. by 13-in. solid aluminum piston, the heat of welding sometimes distorted the wrist pin bore and the piston had to be scrapped. On both pistons, welding lowered the Brinell hardness of the ring carrier considerably, and the lack of hardness in the carriers of welded pistons increased ring groove wear when the pistons were re-installed.

The solution of the problem seemed to lie in the application of a new ring carrier to the piston. This would overcome the difficulties and uncertainties of welding the pistons, and give us a repaired piston that would serve as well as new.

In August, 1952, we conferred with the Factory Rebuild Service of American Locomotive Company, at Auburn, N.Y., and found that they had started on a solution to the problem along the same lines that we had in mind. They had under development a premachined ring carrier for their 9-in. by 10½-in. oil-cooled aluminum pistons. This ring carrier would be shrunk-fit on the piston after the old carrier had been turned off, and then the carrier would be fusion-welded to the piston at the crown. No machining would be necessary, and no welding would be done on the wearing surfaces of the carrier.

This new method looked promising, and the Lehigh Valley agreed to the American Locomotive Company's

suggestion that we install the new ring carriers on pistons of our overhauled 9-in. by 10½-in. engines on a test basis. Under this agreement the first premachined ring carrier was installed in November, 1952, and 84 9-in. by 10½-in. premachined ring carriers have been installed in our Alco engines since.

The 9-in. by 10½-in. premachined ring carriers supplied by Alco are composed of a special aluminum alloy. The ring carrier blanks are forged and then heat-treated. The Brinell of 90 is preserved during Alco's machining of the carriers, so the original hardness of the aluminum is delivered to us intact.

The piston to be repaired is placed on a lathe, and the old ring carrier is turned off. After the old carrier has been turned off, .020 in. is taken off the piston itself from shoulder to crown. This insures a good, smooth fit for the new carrier.

The new premachined ring carriers are placed in an oven at 425 deg. F. for approximately an hour before their application to the piston. The 425 deg. F. temperature for an hour does not reduce the hardness of the metal and expands the carrier sufficiently to clear the .020 interference. After the carrier has been heated, it is merely slipped down on the piston, firm against the shoulder, and cooled. A hydraulic press or weight may be used to make certain the ring carrier is firm against the shoulder.

The joint between the crown and the top of the premachined ring carrier on the 9-in. by 10½-in. piston is welded, not to hold the ring carrier in place, but to insure a seal against combustion gases under pressure working down between the carrier and the piston to the oil-cooling grooves. We employ a straight heliarc fusion weld, with a 5/16-in. tungsten tip. The piston is placed on a turntable under the torch, and a water-cooled jacket is placed around the ring carrier. We are now investigating the possibility of employing an SMP deposit weld, and pistons and ring carriers welded together by this method are being tested at American Locomotive Company's laboratories.

After welding the contour between the piston crown, the ring carrier is blended by turning. The piston is then ready to be returned to service.

There are many advantages to this method of piston repair. First, of course, there is no possibility that the oil-cooling grooves will be sealed or obstructed during the repair. Second, the original hardness of the ring carrier is obtained on the wearing surfaces. This Brinell is 90 after the carrier has been machined, and little hardness on the wearing surface is lost during the heating and welding of the carrier.

Tests have shown that the hardness of the carrier after it has been in service for 1,500 hours has retained a Brinell of 86 at the ring grooves. It is much harder than the piston itself, which drops from the original Brinell of 115 to Brinell 40 or 50 in the heat area during operation. On a piston where the old method of welding and remachining the ring carrier has been followed, a Brinell of about 50, and sometimes as low as 40, is found in the welded area along the ring grooves. The premachined ring carrier is 30 or 40 Brinell higher than this. We feel that this added hardness on a wearing surface is a desirable characteristic.

Our costs for this new method of repairing pistons are approximately the same as those incurred by the welding and remachining method. The new method required no new equipment in our shops, and the change-over was economical. Now, for approximately the same cost, we feel we are getting a much better reclaimed piston.

Fig. 4—The new pre-machined ring carriers are heated at 425 deg. F. for one hour, and then slipped over the piston. A hydraulic press or weight may be used to make certain that the carrier fits snugly against the shoulder of the piston.

Fig. 5—A heliarc fusion weld is used at the joint between the premachined ring carrier and the piston. The weld prevents hot combustion gases from working down into the oil cooling grooves. A water jacket carries excess heat away from the piston.

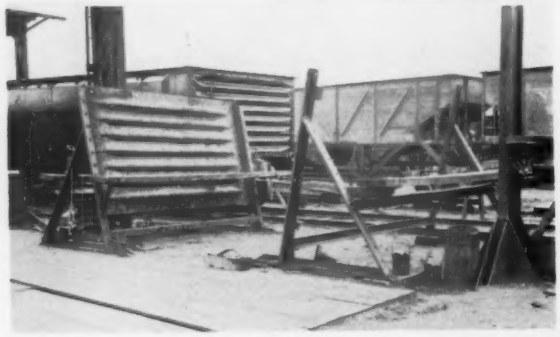
We have been installing the premachined ring carrier on pistons from our overhauled 9-in. by 10½-in. Alco engines since last November. Although results are not conclusive at this time, we have had no trouble with pistons rebanded with Alco's premachined ring carrier, and we do not anticipate any. We expect the pistons to operate as new and see no reason why an indeterminate number of the new ring carriers cannot be applied to an individual piston, as long as the piston itself is in good condition.

Recently we began testing the premachined ring carrier on our 6-cylinder 12½-in. by 13-in. Alco engines. The new method obviates the danger of heat distortion of the wrist pin on this piston. The procedure varies little with that used on the 9-in. by 10½-in. piston, although our 12½-in. by 13-in. pistons are solid and non-oil-cooled. The piston is turned down to the diameter where

it will receive the premachined carrier with the correct interference, or shrink, fit, and the heated carrier is slipped over the piston. Care is taken to see that the valve pockets machined into carrier line up with those on the piston. After cooling the valve pocket joints are benched to blend with the original valve pockets. No welding is done on this piston because of the absence of oil-cooling grooves.

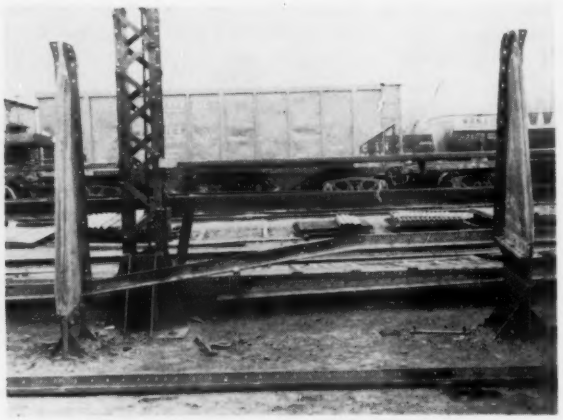
We have installed these 12½-in. by 13-in. ring carriers recently on two of our engines and will install five more sets as the engines come in for overhaul. We are closely watching the operation of these new carriers.

It appears so far that the premachined ring carriers in both sizes will solve the problems of aluminum piston reclamation on Alco engines. The American Locomotive Company is working closely with us in checking results and testing new procedures, and we are confident that the final results will be successful.

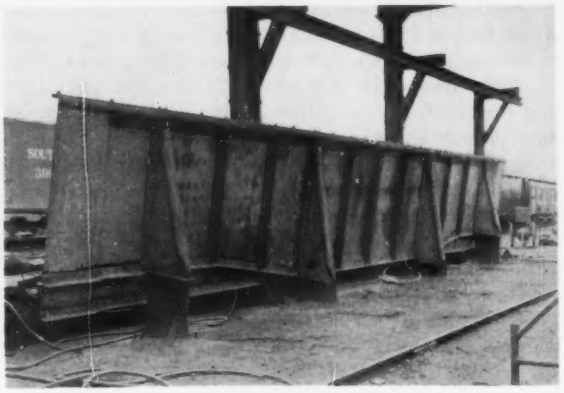


The end jigs have stands for holding tools and small supplies.

The side jig with the gussets in place ready to build up the side



How the intermediate (left) and the bolster (right) gussets are held



The completed side ready for removal from the jig for hanging

Gondola Car Side and End Jigs

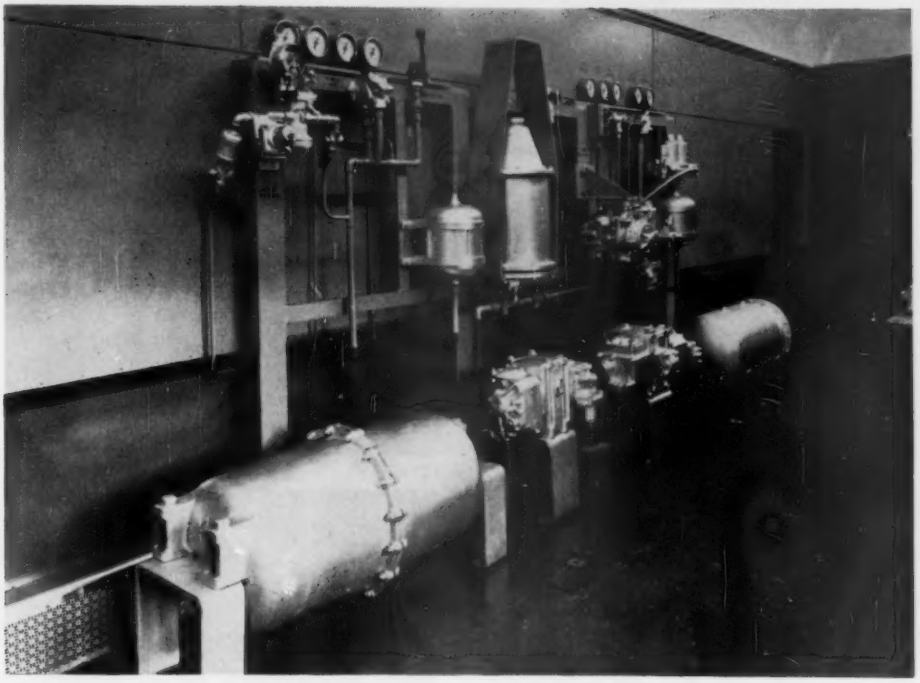
The Chicago and Illinois Midland has built jigs for pre-assembling gondola sides and ends during heavy repairs to the car at its Taylorville, Ill., shops. With the jigs the men can do as much as possible of the fitting up and riveting where it is handier to do the work and to get at the tools. The use of the jigs further provides cooler and more comfortable working conditions in the summer than inside the car.

There are four jigs for assembling the sides, two on each side of the track where the gondolas are overhauled. The bolster side gussets (the short ones) have the floor connection angle in place and bolt through the bottom of this angle to the T-head of the corresponding pedestal of the jig. The intermediate side gussets bolt directly to their pedestals through the sides. The pedestals for both types of gussets are of ½-in. steel plate. The side sill angles rest in slots in the pedestals, the sub side sill angles rest on shelves of ⅜-in. by 3-in. angle.

The sheets that make up the two sides are lifted in place by a 1-ton electric hoist. They are held in position for riveting with fit-up bolts. The finished sides, which include side gussets and side posts, are applied to the underframe with two 3-ton electric hoists, and are held for riveting with fit-up bolts.

The ends are also pre-assembled on jigs, which are made from scrap top chord angles. The end jigs have a stand on either side of the end being assembled to hold tools and supplies. The stands are also made from scrap top chord angles.

In the case of both the sides and the ends everything possible is riveted before hanging, including one side of the grab irons, ladders, etc.



AB freight and electro-pneumatic brake equipment. The freight brake includes a single-car test device.

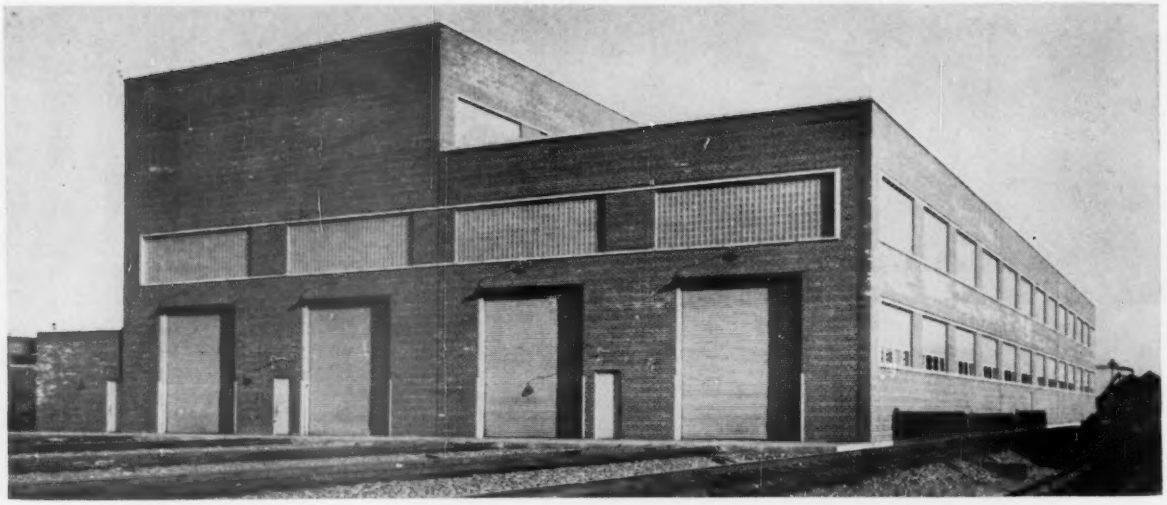
Reading Instruction Car

THE Reading recently completed at its Reading shops an instruction car which is to be moved over all parts of the road to instruct enginemen in the operation of diesel locomotives, and enginemen, trainmen and shop personnel in the operation and maintenance of various types of air-brake equipment. It has a full set of controls for a modern diesel locomotive, and air brakes used on locomotives and freight and passenger cars, including the AB freight brake and the electro-pneumatic passenger brake. The classroom in the car is equipped with the latest in audio and visual training aids, including slide and moving-picture projectors, a reflected light machine for projecting directly from printed material, and a tape recorder. For lectures, it will seat 22 persons.

The car is self-sustaining. Three phase a.c. electric power is available from a Waukesha Enginator of 25 kw. capacity underneath the car. Behind a partition back of the control stand in the classroom section is a steam generator and a 350-gal. water supply tank. At either side of the end door is a compartment, in one of which is a Westinghouse motor-driven air compressor and reservoir, and in the other, a motor-generator set with an output of 2 kw. of d.c. power at 80 volts. The car is air conditioned.

Across the other end of the car is an office with a desk, bookcase, and couch. Opening from a center corridor at this end of the car is a toilet room on one side and a compartment on the other in which are the control panels for lights and power equipment.

The car was a part of the equipment exhibited by the Reading at Philadelphia late in October. A Fairbanks-Morse "Train Master" locomotive, the first of nine 2,400-hp. units being put into service by the road, was also a part of the exhibit.



Automatic Ventilation Features Ontario Northland Shop

THE main section of the diesel shop recently built by the Ontario Northland at North Bay, Ont., is 104 ft. wide by 260 ft. long. It is divided longitudinally into two approximately equal sections, with two through tracks for servicing and two tracks for repairs.

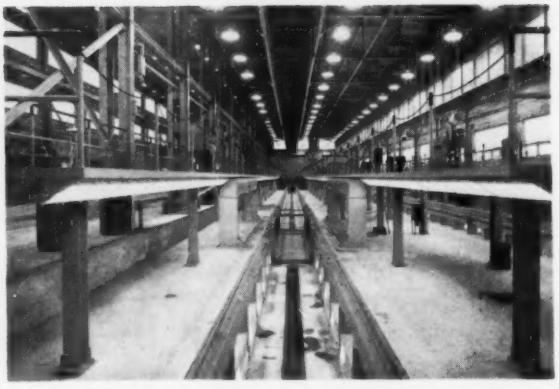
Each track in the service area has a capacity for four diesel units. There are elevated platforms on each side of the tracks at the locomotive floor level and a depressed floor beneath for servicing trucks. The exhausts both of main engines and the steam generators in this area discharge into continuous ducts suspended over each track for the full length of the building. Each duct is connected to motor-driven exhaust fans in the roof. The fans are automatically started and stopped as the temperature rises and falls.

The repair area has two stub tracks—one for truck repairs and one for locomotive overhaul. Along the north side of the repair shop are shop offices, electrical department, and rooms for charging storage batteries and for corn blasting motors and generators.

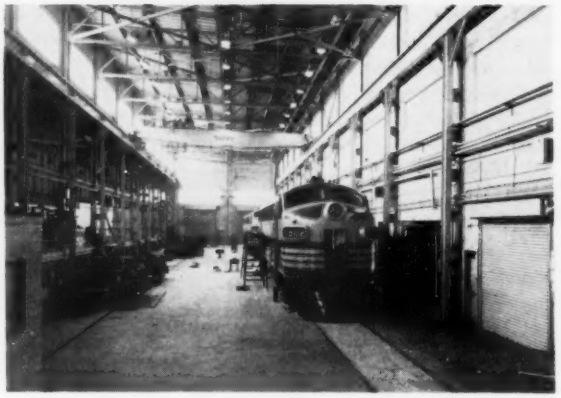
The three-story annex at the east end of the main building is 60 ft. by 70 ft. In the basement are wash and locker, fan, and lubricating-oil rooms. A storeroom, parts reconditioning room, parts and filter-cleaning room, and the foreman's office are on the first floor. Lunch and lecture rooms and an apprentice classroom are on the second floor.

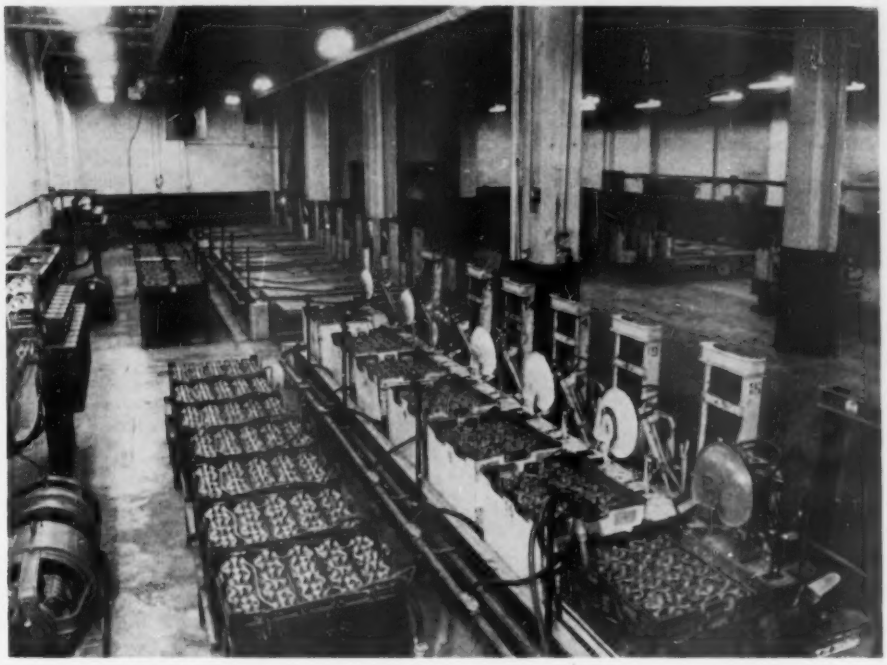
Mercury-vapor lamps, with alternate incandescent fixtures for color correction, light both the high and low bays.

A service tunnel under the tracks in the shop connects the existing steam locomotive shop with the diesel shop.



Pit and platform construction as well as variety of lighting is shown above. The repair section is seen below.





The battery room showing m.g. sets and charging control panels: spare battery racks and trucks with batteries on charge.

Electric Trucks Show 98 Per Cent Availability

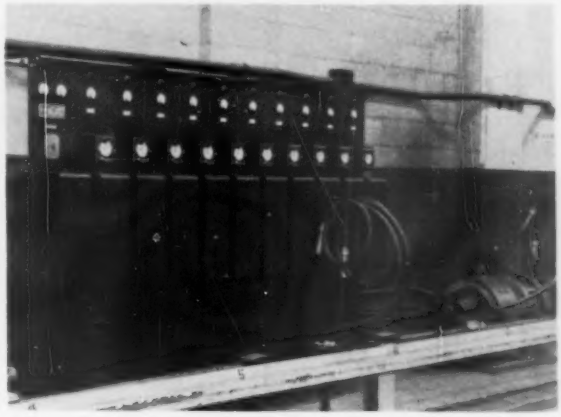
Pennsylvania's Polk Street Freight Terminal in Chicago chalks up a record for operation of battery-powered trucks

A two and a half year record of electric trucks used to handle freight in the Pennsylvania's Polk Street Freight Terminal in Chicago shows that the average availability of the trucks is 98 per cent. This record rests on the inherent dependability of the trucks and on the facilities and methods established in the terminal for servicing trucks and charging batteries.

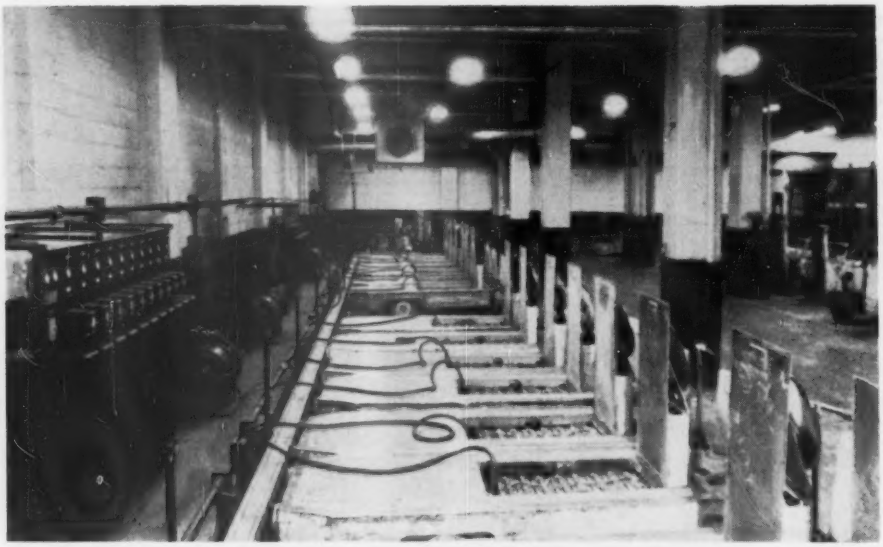
The truck fleet is made up of 30, 2,000-lb. shuttle trucks and 15, 2,000-lb. fork trucks. Twenty-four-cell, 225 amp.-hr. batteries are used on the shuttle trucks, and the fork trucks are equipped with 30-cell, 281-amp.-hr. batteries.

The usual working day for trucks is midnight to 4:00 p.m. Most of the battery charging is done with the batteries on the trucks between 4:00 p.m. and midnight. Spare batteries amounting to 50 per cent of those on the trucks are kept in the battery shop. These are charged during the day trick, between 8:00 a.m. and 4:00 p.m. When a truck battery needs additional charging to complete its 16-hr. daily service, it is changed in the battery shop. It takes about five minutes to change a battery.

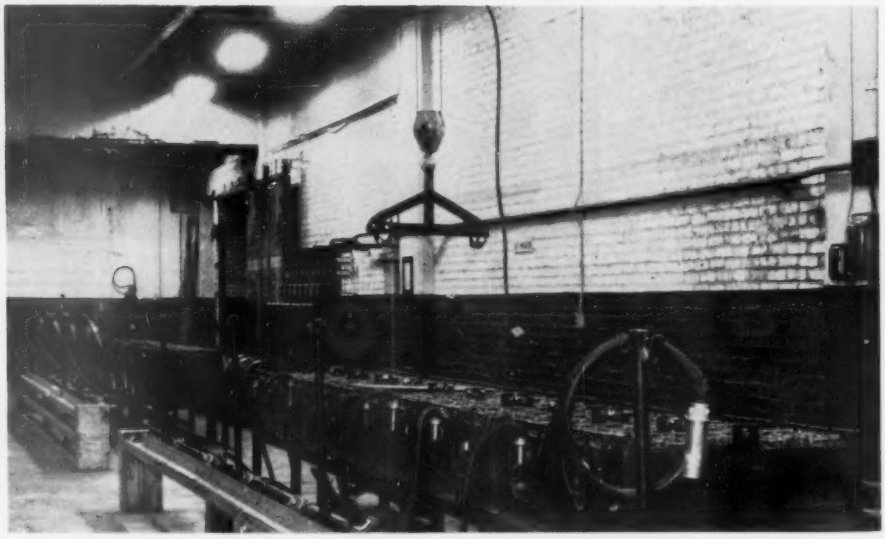
Trucks are greased and minor repairs are made between



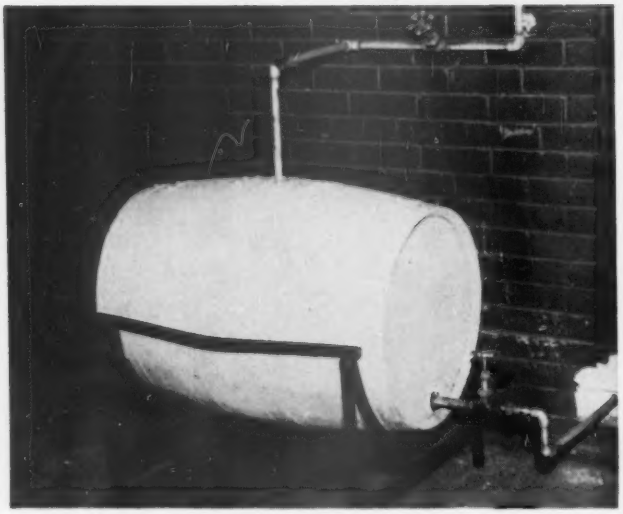
One of the five charging control panels.



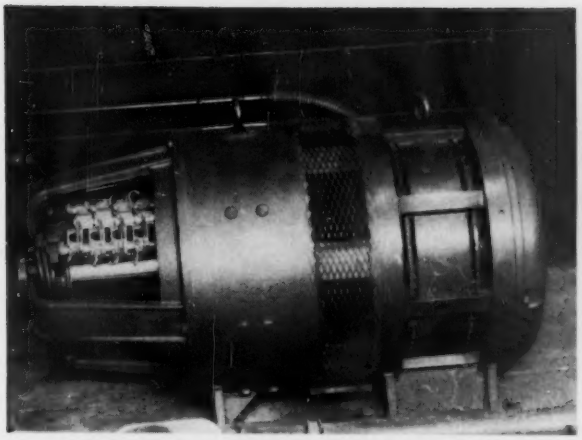
Shuttle trucks with batteries on charge.

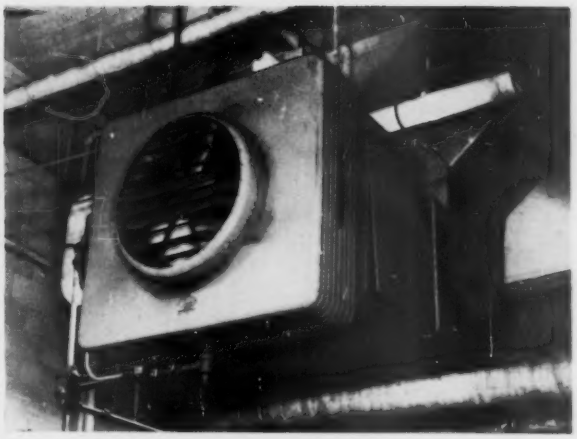


The spare batteries and the hoist with its lifting bar.

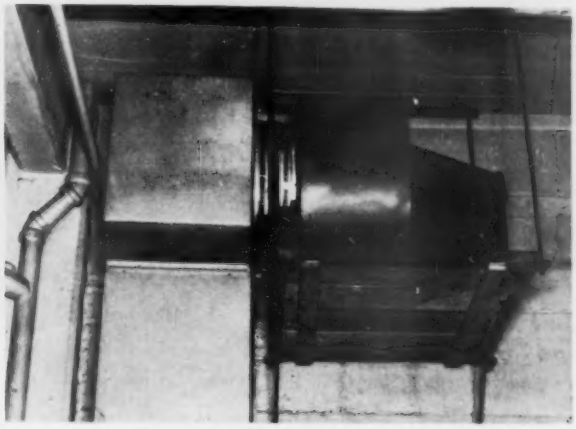


Left: Battery flushing water barrel. Right: Each battery flushing connection includes a valve and a quick-connecting hose coupling.





Left: A 30-kw. battery charging set. Right: This blower can deliver 7,400 c.f.m. of fresh air to the battery—either hot or cold.



Left: One of the two recirculating heaters. Right: The exhaust blower—capacity 7,200 c.f.m.

4:00 p.m. and midnight. Major repairs and overhauls are made between 8:00 a.m. and 4:00 p.m.

Trucks are checked for availability at 9:00 a.m. each working day. The record of these checks, made over a period of two and a half years, is shown in the table. The average availability is about 93 per cent.

The principal cause for trucks being out of service has been flat tires. This condition is being remedied by replacing the pneumatic tires with cushion tires on the rear wheels. The pneumatic tires are retained on the front wheels to provide easier steering of the truck, and better riding for the operator. No increase in maintenance has been noticeable due to the use of cushion tires.

Battery and Truck Repair Shops

Two rooms in the terminal are devoted, respectively, to truck maintenance and to battery charging and repair. The truck shop which measures 47 ft. by 20 ft., has an 18-ft. ceiling, and is lighted by 9 open-end industrial fixtures, each equipped with two 40-watt, instant-start fluorescent lamps, suspended 6 ft. from the ceiling. Also suspended from the ceiling are three Reelite extensions which provide portable lights for working on the trucks. Daylight is supplied by steel-frame windows, and glass block sections 5 ft. 6 in. high, which extend the full length of one side wall. Heat is furnished by four 7-section steam radiators, each 7 ft. 9 in. long and 28 in. high.

The shop is equipped with benches and all of the tools

SERVICE RECORD FOR ELECTRIC TRUCKS

Dates 1951	Shuttle Trucks 30 Units Total Days	Shuttle Trucks 30 Units Service Days	Shuttle Trucks 30 Units Per Cent Availability	Fork Trucks 15 Units Total Days	Fork Trucks 15 Units Service Days	Fork Trucks 15 Units Per Cent Availability
June	630	621	98.6			
July	630	626	99.2	315	315	100
August	690	688	99.1	345	342	99.1
Sept.	480	479	99.8	240	240	100
Oct.	540	539	99.8	270	269	99.6
Nov.	750	750	100	375	352	93.9
Dec.	690	690	100	345	335	97.1
1952						
Jan.	780	780	100	390	384	98.5
Feb.	840	838	99.8	420	414	98.6
March	930	930	100	465	464	99.8
April	810	808	99.8	405	405	100
May	690	690	100	345	343	99.4
June	720	720	100	360	360	100
July	720	720	100	360	360	100
August	720	694	95.4	360	351	97.5
Sept.	750	737	98.2	375	364	97.1
Oct.	810	794	98.0	405	389	96.0
Nov.	720	687	93.9	360	338	93.9
Dec.	780	774	95.3	390	353	90.5
1953						
Jan.	760	762	97.7	390	368	94.4
Feb.	690	682	98.8	345	309	89.6
March	780	757	97.0	390	362	92.8
April	780	765	98.1	390	381	97.6
May	750	729	97.2	375	346	92.2
June	750	715	95.3	375	370	98.6
July	780	757	97.0	390	367	94.1
August	780	733	94.0	390	381	97.7

A fork truck and a shuttle being serviced in the truck repair shop.

required for replacing truck parts, lubricating trucks and repairing tires.

The battery shop is 106 ft. long by 56 ft. wide and has an 18 ft. ceiling. It is lighted by 32 open end industrial fixtures, each equipped with two, 40-watt, instant-starting fluorescent lamps suspended 12 ft. above the floor.

Special provision is made for heating and ventilation. The battery room is heated in cold weather by a Modine unit heater which has capacity for heating 7,400 c.f.m. of fresh air, and by two Modine, motor-driven unit heaters which recirculate the air in the room. The fresh air heater brings in 7,400 c.f.m. of air without heating, when the weather is warm and air is removed from the room by an exhaust fan having a capacity of 7,200 c.f.m. All of the heating and ventilating units are ceiling-mounted

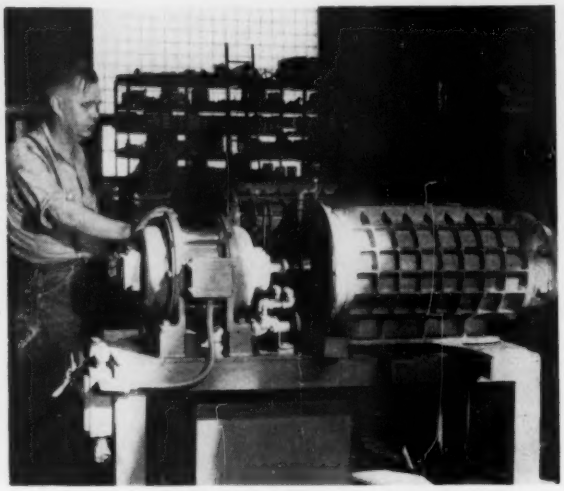
Charging current for the batteries is supplied by five motor generator sets placed along the side walls, two on one side and three on the other. Two of the sets consist of 37.8-kw., 60-volt, d.c. generators driven by 50 hp., 440-volt, 3-phase, 1,750 r.p.m. motors, and 3 are 30-kw., 48-volt generators, driven by 40-hp. motors.

Trucks brought into the battery room for battery charging are lined up against steel bumper rails on either side of the shop as shown in the illustrations. The charging circuits are carried along the outside of these rails. Each charging lead is terminated in a 100-amp. plug brought out at each truck location. Racks for holding spare batteries are placed along one side of the shop between the truck bumper rail and the wall.

Each charging circuit is controlled separately. Against the side walls are panel boards having one panel for each charging circuit. Batteries are charged at a constant-current rate, the amount of charge required being determined by a fork tester before the charge is started. The ampere-hour meter on the panel is then set for the number of hours of charge required, and it trips the breaker on the panel when the charge is completed.

When a battery is to be moved from a truck to the battery rack or from the rack to the truck, it is lifted with a one-ton electric hoist which can be rolled along a monorail, located over the center of the battery racks. For this operation, the truck is placed under the monorail between the battery racks. The lifting speed of the hoist is 17 ft. per min.

Batteries are flushed with a filling nozzle using city water which is suitable for this purpose. A gravity feed is provided for this, since city water pressure would cause splashing, and be difficult to handle. A barrel on the floor above is filled with water, and the water is piped from the barrel to quick-connecting hose couplings on the columns in the battery room below.



The test assures that the blower will operate satisfactorily when placed on a locomotive.

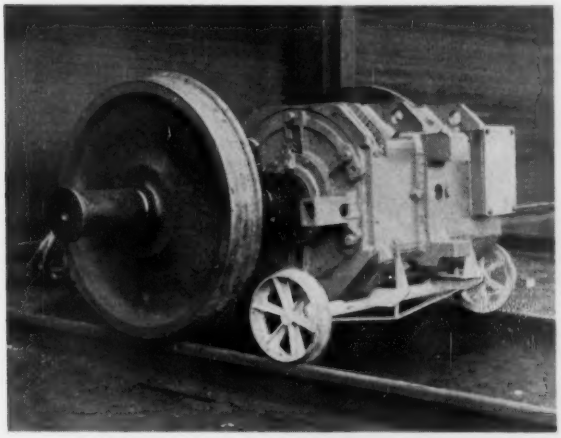
Run-In Test for Blowers

The Great Northern has devised means for making run-in tests on overhauled General Motors engine blowers which gives good assurance that the blowers will stay in service after they have been put back on the locomotive. For this purpose the blower, coupled to a 5-hp. driving motor is placed on the stand shown in the photograph. Motor and blower are coupled by a flange connection on the motor shaft which fits the driving flange on the blower.

The blower is driven at 1,150 r.p.m., which is the normal operating speed of the motor and which corresponds to the blower speed when the engine is running on the fifth notch. A gear pump shown on the stand between the motor and blower is driven by a flat belt from the hub of the motor coupling. It delivers oil from the tank underneath the pump to the blower bearings at 45 lb. per sq. in.

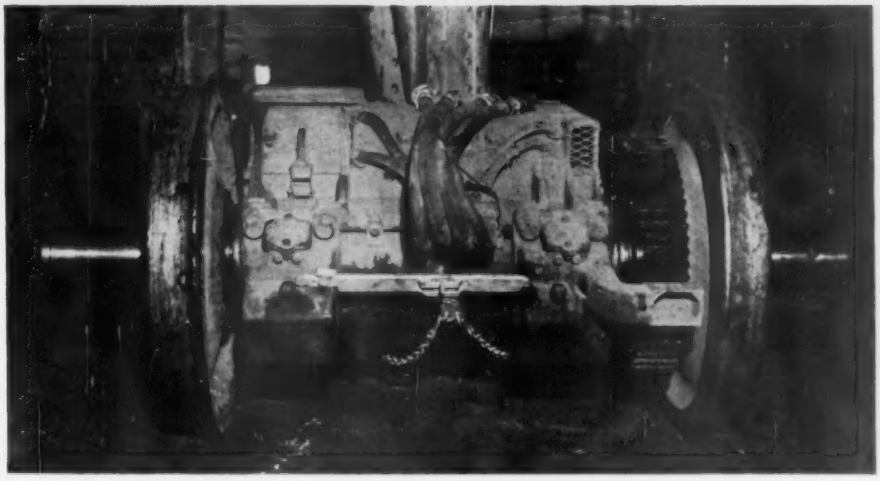
The blower is run, first to determine that clearances between the impeller and housing are correct and it is then run for 30 to 45 min. while bearing temperatures are watched. A screen is placed over the blower intake to prevent foreign material falling into the blower and a sheet of paper is placed under the blower. If there is an oil leak in a bearing, it will show up very quickly on the paper.

The motor control consists of a Cutler-Hammer safety switch and Allen-Bradley reversing switch and a stop-and-start pushbutton control station. The reverser is used to accommodate right- and left-hand blowers respectively. This method of testing was developed at the Dale Street, (St. Paul, Minn.) shops of the Great Northern.



Above, left: A traction motor in place on a dolly.

Above, right: The complete equipment with its inventor.



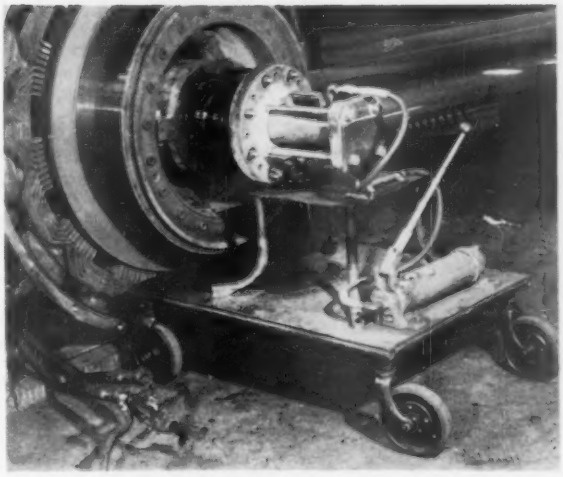
Right: The chains which hold the dolly in place are made adjustable by a number of holes in the attachment plate at the ends of the chain.

Light-Weight Dolly for Moving Traction Motors

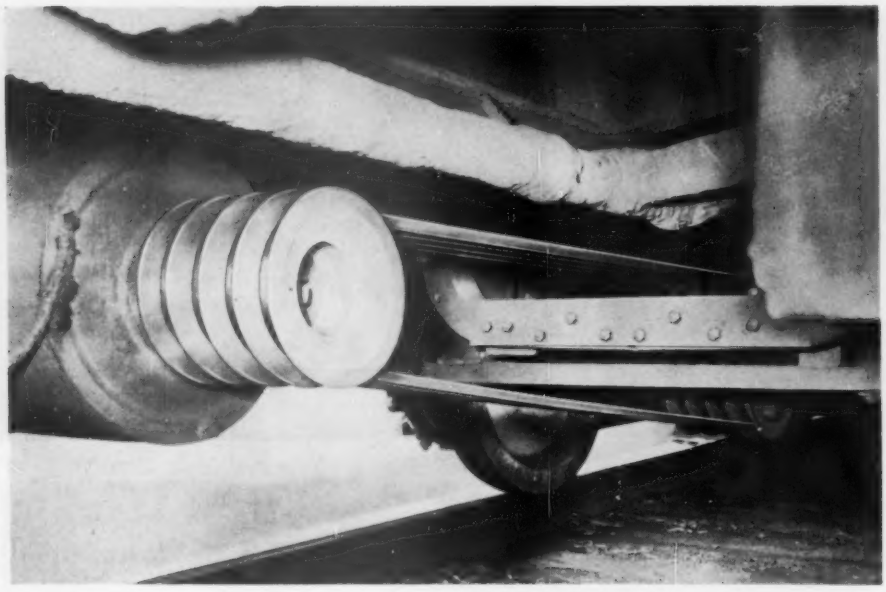
The dolly shown in the illustrations has proved to be a practical device for moving diesel locomotive traction motors with their wheels and axle from one point in the shop to another. It consists of a pair of wheels on an axle with motor support bars attached to the axle, and chains and a crossbar for holding the dolly in place under the motor. The total weight of the device is 146 lb., making it possible for one man to move it about the shop and, with the aid of a two-ton hoist, place the motor on the dolly. Three men can move the motor when it is on the dolly.

To put the dolly in place, the nose suspension end of the motor is picked up with the hoist and the dolly is rolled underneath the motor. It is secured in place by the two chains and crossbar as shown in one of the illustrations. The attachment plate at the ends of the chains slides through a slot on the crossbar and is pinned through holes in both members. There are a number of holes so that the dolly may be used with motors of different size.

The dolly was designed and made by Theodore Rogatchoff, 1512 Latrobe Park, Baltimore, Md.



BEARING PULLER TRUCK. The bearing puller with its hand pump provides an effective means of removing diesel-electric locomotive generator bearings. The thing that really makes it good is the rubber-wheeled truck which puts the puller at exactly the right height and makes its alignment with the bearing easy. The Dale Street shops of the Great Northern in St. Paul, Minn., developed this one.



Axle drive on a Super Chief diner equipped with four one-inch endless belts, showing the endsill splice.

Santa Fe Solves Generator Drive Problem

Axle generator drives employing four endless V-belts average 200,000 miles per belt under difficult operation conditions

On the Santa Fe, as on any railroad, the job of keeping axle generators operating at maximum efficiency on all passenger trains is a major maintenance problem. It is a "must," that batteries be kept fully charged and thereby obtain the utmost in service and performance from electrical and air conditioning equipment for the passengers' safety and comfort. A thorough analysis of our electrical and air conditioning failures disclosed that power failure from short life and belt loss was a primary source of trouble.

These belt failures and resultant loss of power necessitated a great deal of yard charging to protect these services. Train schedules, in many cases, were such that short layovers made it difficult to get the job done with available facilities. Excessive rates of charge and overcharging resulted in shortened life and deficiency of batteries. Some concerted action to improve road performance of belt-driven, body hung generators had to be taken.

We reviewed all types of generator belt drives currently in use on the Santa Fe, including a test of one-inch endless V-belts applied to a few cars several months before, in collaboration with, and under the supervision of the Dayton Rubber Company engineers. The cars were originally equipped with conventional flat belts and fasteners. The test began with three one-inch endless V-belts on slow-speed Safety Company, 10-kw. generators and continued until one or more V-belts was lost. The net average life was slightly over 100,000 miles per belt which was an improvement over flat belt performance.

J. V. Dobbs

We were still skeptical as to whether the endless V-belt was the answer to our problem, so the test was reinstated, using four one-inch endless V-belts per drive

Mr. J. V. Dobbs, Car Lighting and Air Conditioning Engineer, Atchison, Topeka & Santa Fe, is the author of this article.

The Santa Fe's all new Super Chief daily all-pullman streamliner between Chicago and Los Angeles ascends the grade near the old Dick Wooton Ranch at Wooton, Colorado.

instead of three. This drive has been under continuous observation for the past 11 months. The average on the 5 cars to date is approximately 200,000 miles per belt, and all are in good condition. No belts have had to be removed due to excessive stretching or elongation because low-stretch belts are used and original belt length is calculated very accurately. These are prerequisites, since the endless belt cannot be shortened.

The test will be continued until optimum belt life is established, but at this writing we cannot predict what it will be. When this is determined we expect to be able to set up a regular belt replacement program to coincide with wheel changes.

Obviously, it is necessary to drop the wheels to install endless V-belts. On the Santa Fe, we also have to cut the endsill and disconect one end of the brake beam on those cars where conventional clasp brakes are involved. However, depending on whether disc or clasp brakes are used, the indicated belt life is well in excess of one or two wheel replacements.

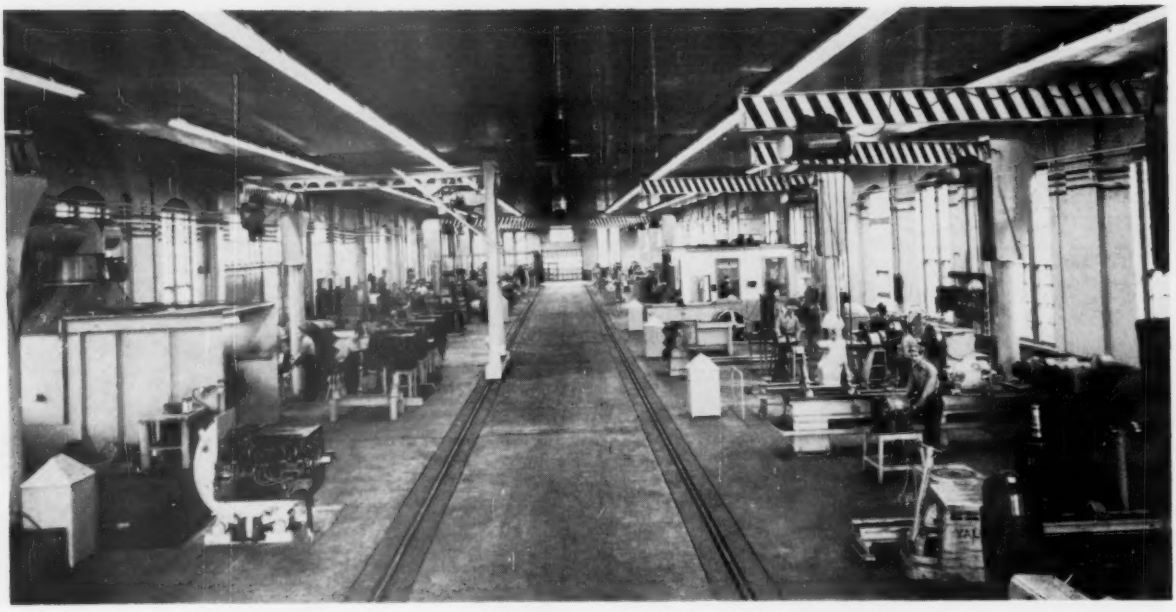
In the event a belt is lost due to flying ballast or other debris before regular renewal time, a connectored belt can be used in emergency. We would also consider the possibility of operating in the interim with three belts before arranging a special wheel removal, since our previous experience shows the drive will perform satisfactorily with three belts.

One of the features of this drive is that the loss of a belt does not cause a power failure, but does direct the maintainer's attention to the need for servicing the drive.

We were naturally most concerned about the split endsill from the standpoint of truck strength and stability. However, a safe, secure, removable splice has been developed by our engineer of car construction, and has proved completely satisfactory on all cars throughout the test period.

Cars equipped with the endless V-belts have been subjected to severe extremes of operating conditions. They have been continuously in "Superchief" line-up for 20 odd months where speeds approaching 90 m.p.h. are sustained for extended periods to make the schedule of 39¾ hours for the 2,500-mile trip from Chicago to Los Angeles. In winter, we may leave Chicago in snow or sleet, and run into rain crossing Missouri and Kansas. In Colorado, where we twist, turn and climb to over 7,000 feet crossing the Rocky Mountains, we may again have snow and sub-zero temperatures and then drop down to the dry, sandy plateau of New Mexico. On into the mountain region of Arizona we climb again to high altitudes where more snow may be flying, then down to the dry, sandy Mojave Desert. Leaving the desert, we curve and climb once more up to Cajow Pass, crossing the coastal range, then wind our way down into southern California. On the same trip in August and September, our ambient temperatures in the Mojave Desert reach 110 to 115 deg. F., with roadbed temperatures actually measuring up to 160 deg. F. In the mountain areas a few hours from there, night temperatures often register in the low 50's. So from sub-zero with snow and ice all the way through to broiling desert heat and sand is an acid test on the Santa Fe,—the acid test also for the heating and air conditioning equipment which depends so much on the power supply.

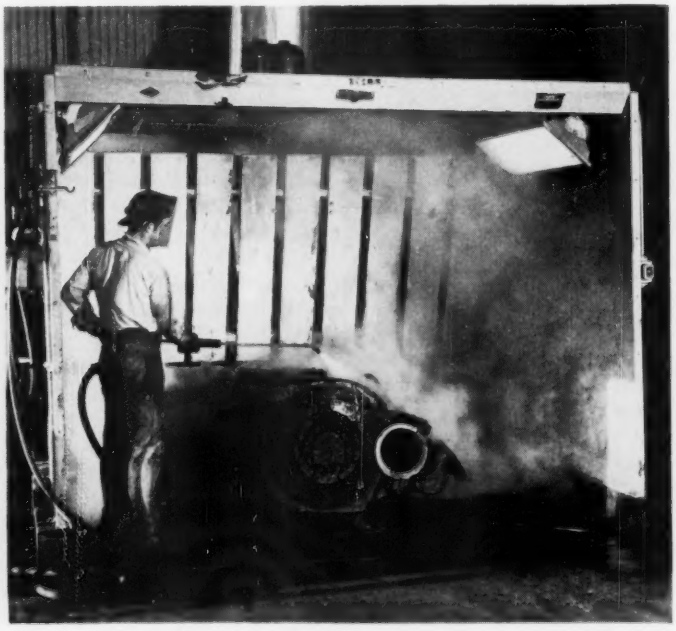
Based on our observations and calculations, we feel confident in extending the endless V-belt drive to additional cars. In fact, all cars of our "Superchief," having axle generators, and many cars operating in other first-class trains, are being equipped. Likewise, the endless V-belt drive has been established as standard on all new lightweight baggage and mail cars recently delivered or presently on order. This is just one more step in the Santa Fe's plan to improve service, comfort and safety for passengers on America's New Railroad.



Diesel traction motor end of the Baltimore and Ohio's Mt. Clare electric shop.

All-Purpose Electric Shop

Baltimore and Ohio builds new electrical shop to handle part of the railroad's basic diesel maintenance and nearly all other motor and control overhaul and repair

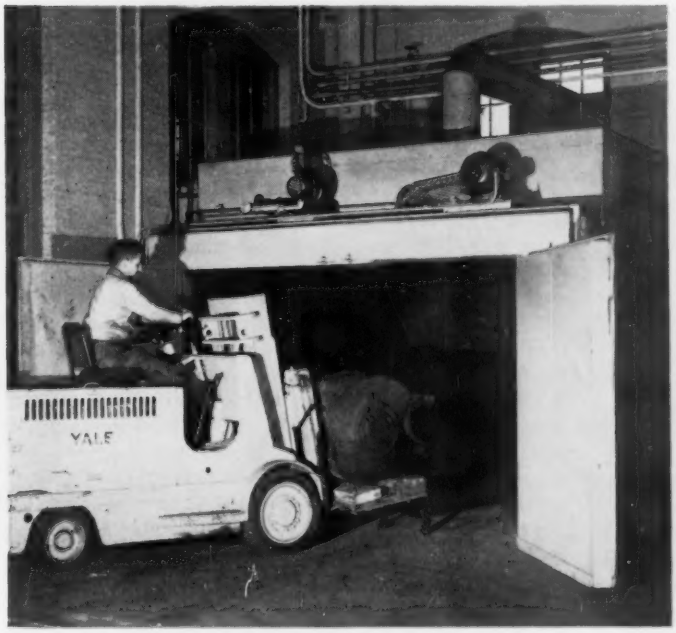


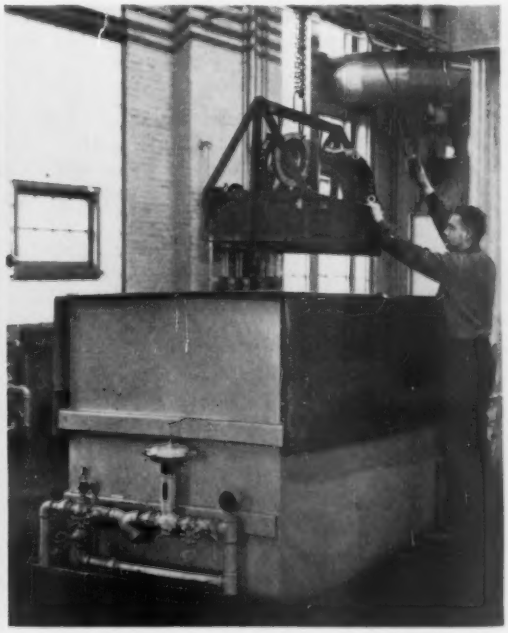
Left: Pinions are removed outside the shop with an induction type pinion heater. Right: Before motors get into the shop, they are steam cleaned.

In the foreground is the section of the shop which maintains all electrical equipment except diesel traction motors and generators. The diesel section is at the far end of the shop.

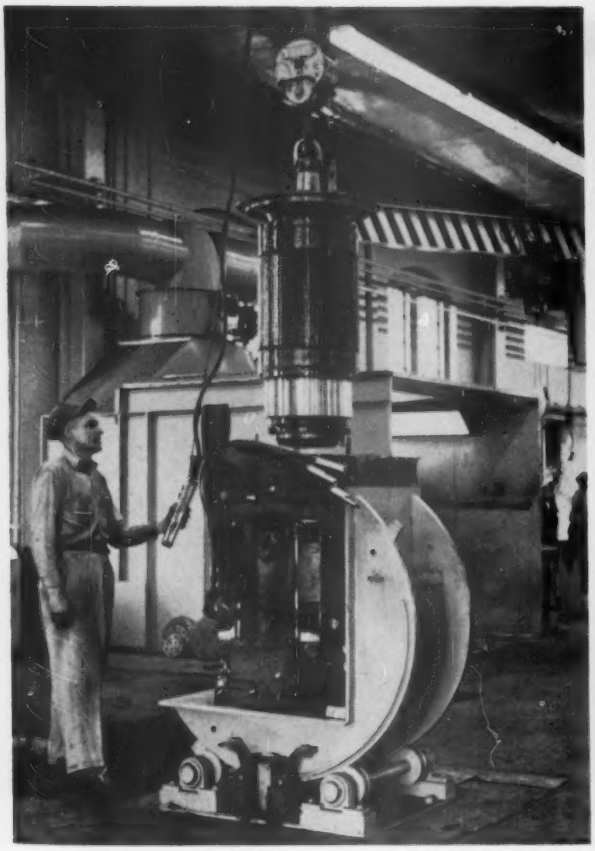
THE Baltimore and Ohio has established an electrical shop in Baltimore, Md., which maintains electrical equipment formerly handled in three of its Mt. Clare shops. These were respectively, the air conditioning, the car lighting and the miscellaneous electrical equipment shops. The new shop also performs basic overhaul work for diesel-electric locomotives.

The shop which is 300 ft. long and 70 ft. wide is all on





Left: The fork lift truck brings the cleaned motor inside the shop and puts it into the gas-fired oven for drying. Right: A basketful of small motor parts goes into the degreaser.



Left: Shop-built up-enders turn the motors at the stripping and assembly stands. Limit switches stop the up-ender at the horizontal and vertical positions. Right: After the varnish stops bubbling in the dipping tank, the armature is lifted out and allowed to drain.

one floor. It is modern in every respect. The gray concrete floor has an inclusion of steel powder which renders it highly resistant to wear. The lower three feet of the walls are finished in a medium green and the upper walls are a light green. The 20-ft. high ceiling is made of corrugated aluminum which is an effective sound deadener. Machine tools and other shop equipment are done in two-tone gray. Vertical columns of jib hoists are gray, while the booms are yellow with diagonal black stripes. The one-legged gantry crane is yellow.

There is an enclosure devoted to the repair of cutting torches in one corner and a built-in and ceiled office and sub-storeroom on one side at the center of the shop. An outside side extension of the building, 25 ft. by 44 ft., houses a bearing cleaning and inspection room, and locker and washroom facilities. There is also an outgoing shipping platform on this side of the building.

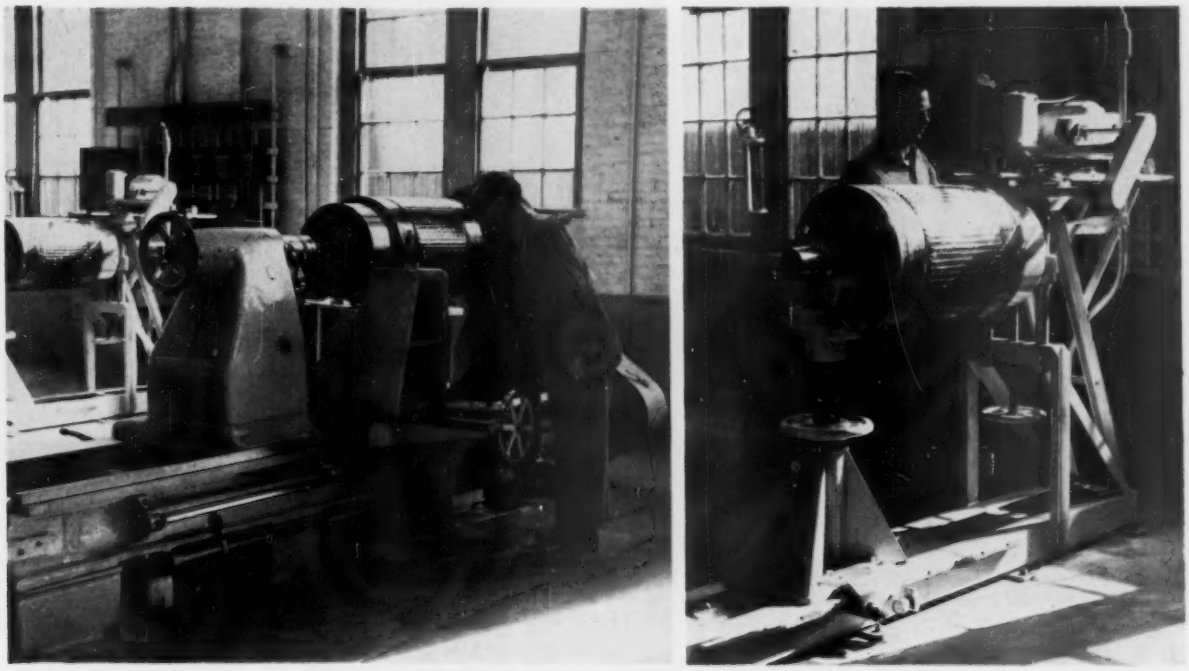
The shop is lighted by four rows of fluorescent lighting fixtures. These are made up of continuous rows of open-end porcelain-enameled industrial units, each unit being equipped with two 96-in. standard cool-white slimline lamps. The spacing between each of the two side rows of units is 14 ft., and the center spacing is 20 ft. Mounting height is 19 ft. 4 in. The total area illuminated is 19,872 sq. ft., and the total lamp wattage (excluding ballast losses) is 30 kw., making 1.52 watts per sq. ft. The average lighting intensity on the working plane, after the system had been in service for some time, was 60 foot-candles. The shop is heated by five ceiling-mounted unit heaters.

As a final touch, there is a potted plant, on a stand, on either side of the foreman's office. The cast iron buffer plates on the large end door frames explain the origin of the building, and provide the only suggestion of any connection with the past. They bear a cast-in inscription which reads—"B & O Bridge Shop, May 1882".

Half of the shop area is used for diesel locomotive electrical equipment repairs. Working one 8-hour trick per day, the shop as a capacity for handling basic overhaul and light repairs on approximately 75 traction motors per month and in addition a number of main and auxiliary generators. At the present time no facilities are provided for traction motor armature and commutator repairs. Traction motor and generator armatures requiring heavy repair are sent to outside repair shops.

The other half of the shop area is devoted to the repair of nearly all other electrical equipment used by the railroad. In it are maintained shop motors, pump motors, crane motors, air conditioning equipment, car lighting apparatus and miscellaneous auxiliary and control equipment. Three benches in the general purpose shops are used for overhauling diesel locomotive contactors and relays.

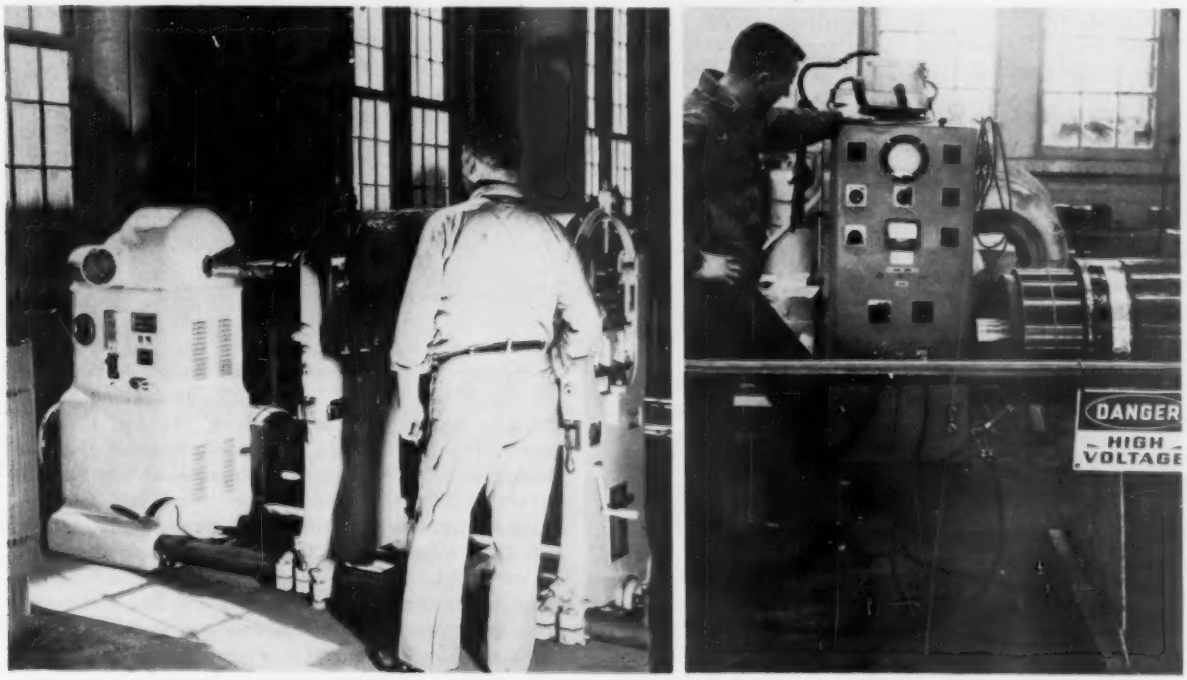
A five-ton, one-legged, floor-operated gantry crane serves the full length of one side of the shop on which the heavier work is done. The floor rail of the crane is 27



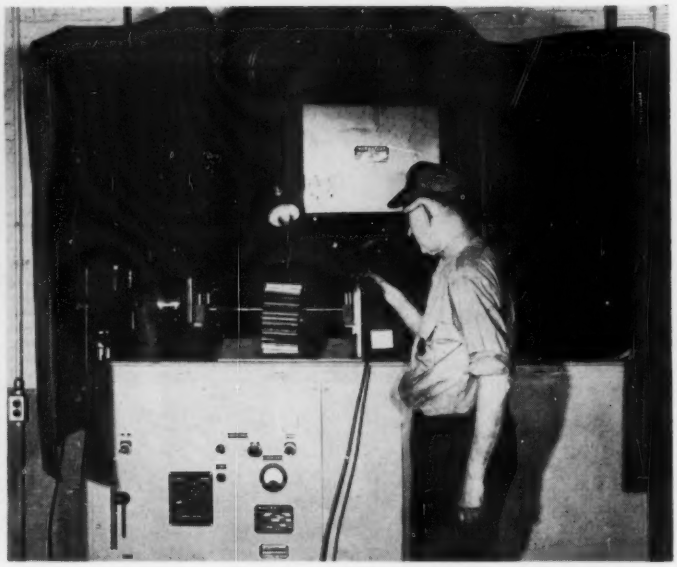
Left: Commutators are given a light cut with a tool and are finished with a fixed stone. Right: After being turned, commutators are undercut and all roughness removed from the edges of bars.

ft. from the wall. A second floor rail is laid on the opposite side of the shop to permit the installation of a second crane at some future date.

On the crane side of the shop, there are five jib cranes, two of three-tons capacity in the section where motor and generator frames are handled, and three of one-ton capacity. On the opposite side of the shop there are six one-ton jib cranes. The crane service is supplemented by a five-ton, electric fork-lift truck and two electric walker-operated trucks.



Left: Careful balancing does much to reduce vibration and extend motor life. Right: A final exploration of insulation condition in the finished armature is made with a surge tester.



Left: Four stages of brush overhaul. First, brush rigging as it comes into the shop,—second, disassembled rigging,—third, cleaned and overhauled part,—and fourth, reassembled and painted rigging with new insulators and polished studs. Right: A traction motor pinion undergoes inspection in the Magnaglo booth.

Traction Motor Overhaul

Traction motors to be overhauled are brought to a roofed area outside one end of the shop. Here they are first given an insulation resistance test and are then steam cleaned with the aid of a solvent. This is done in a cleaning booth fitted with an exhaust hood. This cleaning removes heavy deposits of dirt and grease which would otherwise be carried over to the degreaser.

After cleaning, the pinion is removed with an electric induction type pinion heater and wedges. The motor is then brought into the shop and placed in a gas-fired oven where it is dried for eight hours at 200 deg. F. After drying, it is allowed to cool and is disassembled on a stripping platform. An up-ender, shown in one of the illustrations, is used to facilitate the removal of bearing supports and armatures.

All small parts are placed together in a perforated metal basket and the field frame, armature and the basket of parts are cleaned in a degreaser. The solvent used is trichlorethylene and the frame and armature time in the degreaser is limited to four minutes. The interior of the degreaser has a plastic coating to protect the tank from the hydrochloric acid which is an end product of the cleaning operation. Two shop-made, air-operated table presses, one on each side of the varnish spray booth, are used respectively for removing and applying bearings.

The spray booth is ten feet square, and is equipped with an exhaust fan and a circulating water curtain at the back in the path of the exhaust air. A solvent in the curtain water prevents deposits of varnish from forming on the air ducts. The interior of the oven, including the fluorescent lighting units is spray-coated with a plastic film which can be peeled off when there is an accumulation of varnish on the walls and ceiling of the booth.

After cleaning, the frames are moved progressively along one side of the shop through several operations, while the armatures proceed along a similar production line on the other side. The cleaned frame is given a high-potential test and leads and coils which require it are reinsulated, or replaced. The inside of the frame is sprayed with air-drying varnish after which the coils receive another high-potential test.

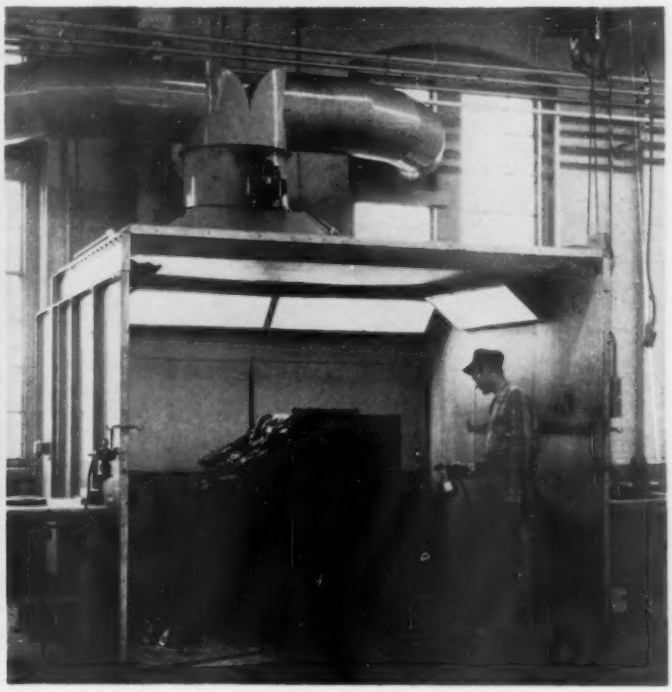
Bearings go to the bearing room where they are demagnetized and put through a series of air-agitated cleaning solutions. The cleaned bearings are carefully inspected under a fluorescent inspection lamp, after which they are given a coating of protective oil. Those which pass inspection are returned to service, being turned 90 deg. to their original position in the housing when they are reapplied. An electric oven is used to heat the bearings when they are applied to the motor shaft. Bearings which do not pass inspection are returned to the manufacturer for reconditioning, or they are scrapped.

Bearing housings and frame bores are checked for size and alignment and when necessary are built up with electric welding and remachined on a horizontal boring and milling machine. Axle support bearing housings are also reconditioned in the same way when necessary. Pinions and gears are checked by means of Magnaglo inspection.

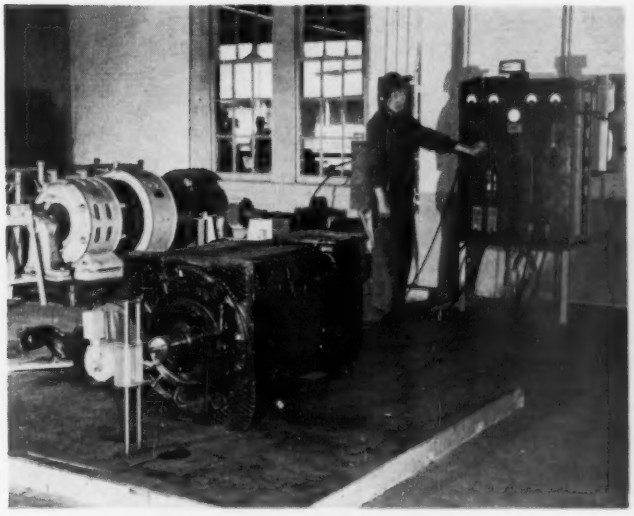
After degreasing, armatures are baked four hours at 150 deg. F. They are then dipped in baking varnish where they are immersed to the risers until bubbling stops. Before dipping, the pinion-end shaft is dipped in masking compound which can be peeled off after baking. After dipping, the armature is baked at 300 deg. F. for 8 hours. It is then cooled on a cooling stand, given an insulation resistance test, a high-potential test for one minute at 2,000 volts and is surge tested.

The armature is then trued on a commutator machine. It is given a light cut with a tool and a finish grind with a fixed stone. It is then moved to an undercutting machine where the mica is undercut and burrs removed. From the undercutter, the armature goes to the balancing machine. After balancing, it is placed on a storage platform ready for reassembly in the frame.

Brush rigging coming from the degreaser is further



Left: An overhauled motor being disassembled. If any of the small parts in the basket is defective, a spare is drawn from the store in the racks beind the basket. Right: A reassembled motor gets a coat of paint in the spray booth. Axle bearing openings and ventilating openings are sealed with wide tape which is kept on during shipment and until the motor is applied to a locomotive.

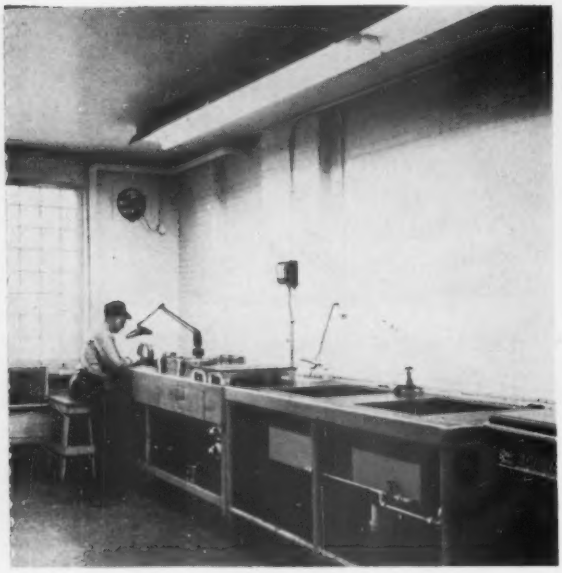


Left: Motor test stand. Voltage from the tachometer generator on the motor shaft records speed in one of the panel meters. In the background may be seen the m.g. set which supplies motor field current. Also shown is a pinion heater. Right: Three benches in the general purpose shop are used to overhaul locomotive contactors and relays.

disassembled on a bench. Brush holders, but not studs, are bright dipped in dilute sulphuric acid for a few seconds. Studs are cleaned with crocus cloth. Insulators are renewed when necessary. The under part and sides of the brush boxes are painted with red insulating varnish to prevent pitting caused by arcing at the brushes.

Reconditioned armatures and frames and other motor parts are brought together at a second up-ender and assembly platform where the motor is reassembled. Axle bearing openings and ventilating openings are sealed with 6-in. wide, waterproof, pressure-sensitive tape. The assembled machine is spray painted and given a high-potential test.

The motor then goes to the test stand where it is run with 550-volt shop power on the armature. Field current is supplied by a motor-generator set and the motor is run at 2,250 r.p.m. for one hour in each direction. Speed is measured by an electric tachometer which is connected to the motor shaft and has an indicating instrument on the test panel. Bearings are checked for tempera-



Left: Bearing room in which bearings are de-magnetized, cleaned and inspected.

Above: The shipping platform from which overhauled motors are loaded into cars and sent to change-out points.

ture and an electric hearing aid is used to detect any unusual bearing noise. The finished motor is moved out at the side of the shop to the loading platform.

Main generators and auxiliary generators are processed in the same way as traction motors.

Diesel-electric locomotive contactors are overhauled on three branches in the miscellaneous repair section of the shop. Here they are disassembled and the parts cleaned. Brass parts are bright-dipped and buffed. Cadmium parts are reshaped or renewed if necessary. If pins are worn, holes are reamed and used with oversize pins. Arc chutes are painted with black insulating varnish and red insulating varnish is used on all insulation and insulated parts.

Shop Tools and Equipment

1 One-legged, five-ton gantry crane serving both ends of the shop.
1 Five-ton fork-lift truck.
2 Walker-type electric trucks.

Diesel Shop

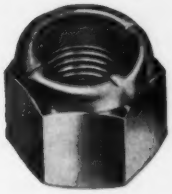
2 Three-ton jib cranes for field frame aisle.
3 One-tone jib cranes for amature aisle.
1 Steam cleaning booth.
1 Gas oven (assembled machines and frames).
1 Electric oven (armatures).
1 Degreaser.
2 Traction motor up-enders.
1 Paint spray booth.
1 Small electric bearing oven.
5 Traction motor repair stands.
1 Traction motor armature and field tester.
1 Pinion heater for removing pinions.
1 Pyrometer to test temperatures of bearings.
1 Pinion heater for applying pinions.
1 Traction motor testing stand and panel.
1 Bearing demagnetizer.
3 Bearing cleaning tanks.
1 Bearing inspection light.
1 Electric welder.
1 Gas welding equipment.
1 Vacuum machine.
1 Hydraulic jack and pump on truck.
1 Auxiliary test stand and panel.
1 Dipping tank for armatures.
1 Magnaglo testing machine.
1 18-in. engine lathe.
5 Armature stands.
1 Armature machine.
1 Commutator undercutter.
1 Auxiliary generator work stand.
1 Auxiliary generator test stand.
1 Balancing machine.
1 Surge tester.
2 Table type presses for removing and applying bearings.
1 High-potential tester.
1 80-ton hydraulic press.

Miscellaneous Repair Shop

1 Test stand for 7½-kw. air conditioning generators.
1 Test stand for 25-kw. air conditioning generators.
1 Banding machine.
1 Tachometer and tachometer generator.
1 Steam turbine test bench.
1 Hand-operated insulation cutter.
1 Motor-driven insulation cutter.
1 Band saw.
5 Motor repair stands.
1 36-in. lathe.
1 Drill press.
1 Coil spreader.
2 Coil winding machines.
1 Electric oven for small machines.
550-volt d.c. and 440/220 and 110-volt test outlets and switches at convenient points.
5 One-ton jib cranes.
Wire storage racks.
Pipe threading machine.
5 Portable electric drills.
Pipe bender.
Car lighting test panel.
4 Small lathes.
Armature storage racks.
5 Motor generator sets for various test voltages.
5 Buffing machines.
5 Grinding machines.

self-locking fasteners

Elastic Stop nuts



HEX NUT

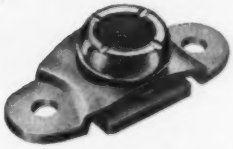
SPLINE NUT

HIGH TENSILE NUT

CLINCH NUT

1200° F. HIGH-TEMP. NUT

GANG CHANNEL NUTS



FLOATING ANCHOR NUT

Every major aircraft now being assembled relies on the vibration-proof holding power of ELASTIC STOP nuts. Only ESNA manufactures a complete line of all types and sizes of self-locking nuts.

Rollpins

dia. from 1/16" to 1/2"

Rollpins are slotted, tubular steel, pressed-fit pins with chamfered ends. They drive easily into holes drilled to normal tolerances, compressing as driven. Extra assembly steps like hole reaming or peening are eliminated. Rollpins *lock* in place, yet are readily removed with a punch and may be reused.

Cut assembly costs by using Rollpins as set screws, positioning dowels, clevis or hinge pins. Specify them in place of straight, serrated, tapered or cotter type pins.

ESNA TRADE MARK

ELASTIC STOP NUT CORPORATION OF AMERICA

ROLLPIN TRADEMARK

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Please send me the following free fastening information:

- ☐ Elastic Stop Nut Bulletin
- ☐ Rollpin Bulletin
- ☐ AN-ESNA Conversion Chart
- ☐ Here is a drawing of our product. What fastener would you suggest?

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City_____ Zone___ State_____

QUESTIONS AND ANSWERS

Diesel-Electric Locomotives*

934-Q.—After the gasket is applied what should be done?
A.—Slip each half of oil catcher into position over oil slinger and insert .006-in. gasket between the halves. Reapply the capscrews and lock washers securing oil catcher halves together.

935-Q.—What then should be done?
A.—Reapply capscrews and lock washers securing oil catcher to turbosupport and free end casing. Center oil catcher on oil slinger using a feeler gage before tightening capscrews. Redowel and apply dowel pins or use old dowels if clearance between slinger and catcher is correct.

936-Q.—What precaution should be taken?
A.—When doweling be sure chips do not fall between the slinger and the catcher.

937-Q.—How are the lubricating oil pump and water pump driven?
A.—Their drive gears mesh with the crankshift extension gear.

938-Q.—Describe the two drive gears.
A.—Each gear has a female splined hub which turns freely on ball bearings in a support.

939-Q.—How is the bearing support secured?
A.—The bearing support is secured to the free end casing by capscrews and doweled to maintain proper back lash and facilitate reinstallation.

940-Q.—Describe the installation of oil and water pumps.
A.—The oil and water pumps have flanges mating with the bearing supports which are secured by capscrews that pass through the supports to the free end casing. The pump drive shafts have spline extensions which fit into pump drive gear hubs.

941-Q.—What is the procedure for removal of pump drive gear assembly?
A.—First remove piping interfering with pump removal, then remove all capscrews from pump mounting flanges and remove pump by carefully withdrawing splined shaft while supporting pump with a hoist attached to a lifting eye.

942-Q.—What action should follow?
A.—Pull out the two dowels with a dowel puller. Support the pump drive gear assembly with a rope looped around a hard wooden stick passed through the gear hub.

943-Q.—How would you proceed to dismantle the pump drive gear assembly?
A.—Place pump drive gear assembly on bench with bearing support up. Bend lugs of locking washer clear of slots in bearing lock nut. Remove lock nut.

944-Q.—What action should follow?
A.—Press gear hub from bearing support. The top bearing (in this position) will be forced off gear hub and remain in place in bearing support because outer bearing space is locked to the support.

945-Q.—Does the lower ball bearing come out with the gear hub?
A.—It may come out with the gear hub or it may remain in bearing support. If the bearing remains on gear hub it can be pressed off by application of three long jacking bolts through holes tapped in gear flange.

946-Q.—Describe the action further.
A.—Remove the capscrew which locks the outer bearing spacer from the bearing support. Remove outer and inner spacers. Press the top ball bearing out of the bearing support.

947-Q.—Describe the inspection and clearances required.
A.—Thoroughly clean and inspect bearings for signs of pitting and wear. Inner races should have a slight interference fit (.0001-.0006 in.) on gear hub. Outer races may have a slight interference (.0011 in.) to clearance (.0004 in.) fit in bearing support.

948-Q.—What is the procedure for reassembly?
A.—Press the retaining ring into the bearing support, lock in place. Apply locking washer and lock capscrews. Press ball bearing into housing.

949-Q.—Describe the action further.
A.—Press housing with bearing and retaining ring on gear hub. Position bearing spacer on gear hub. Apply second bearing on gear hub and in housing. Install keyed locking washer and bearing lock nut. Tighten nut and lock in place.

950-Q.—What action is required on installation?
A.—Reverse the removal procedure. Install new gasket between bearing support flange and the free end casing. Position by driving dowels before tightening up the two capscrews. Check gear backlash with a dial indicator.

951-Q.—What is the initial operation if a new pump drive gear assembly is to be applied?
A.—Place drive gear assembly with gasket in position, without dowels, and snug up capscrews.

952-Q.—What action should follow?
A.—Rotate bearing support clockwise or counter-

(*Continued on page 70*)

* This series of questions and answers relate specifically to the Alco-G.E. Diesel electric locomotives. The figure numbers and references, by number, to diagrams, etc., relate to the current edition of the Alco-G.E. operating and maintenance manual.

Famous Problems IN RAILROADING

A railroad wants to put through a right-of-way and station to serve 3 rural towns. Town A has 350 population; town B, 500; town C, 650. Assume you have a map showing the relative positions of the villages. All other conditions being equal, can you suggest a method for determining the most advantageous location for the station as far as the population distribution of the 3 towns is concerned. You can throw away the math books for this one.

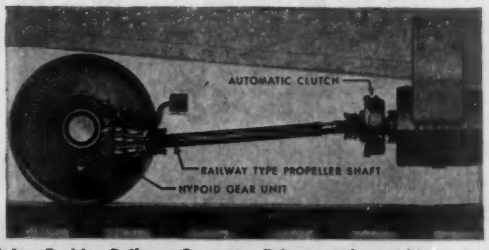
See next month's Spicer Generator Drive advertisement for answer.

SOLUTION TO DECEMBER PROBLEM

Jones, $4,760; Smith, $1,400; Brown $560. The solution is most easily seen by dividing the trip into 8 laps, 4 going and 4 returning. Jones must pay full cost on 4 laps: the first 2 going and the last 2 returning; half cost on 2 other laps; and one-third cost on 2 laps. Smith pays half fare on 2 laps, and one-third fare on 2 laps. Brown pays only one-third fare on 2 laps. Counting the lap payments, we find Jones owes 5⅔; Smith 1⅔; and Brown ⅔. Each lap cost $840, so the proportionate cost is determined by a little multiplication.

Famous Solutions TO RAILROADING PROBLEMS

The ever increasing national and foreign use of the Spicer Railway Generator Drive marks the correctness of its design, and its efficiency in solving the problem of supplying ample electrical energy for lighting, air-conditioning, refrigeration and other electrical equipment.



Spicer Positive Railway Generator Drives can be quickly and economically adapted to new car designs and reconditioning jobs.

In America alone, nearly 10,000 Spicer Drive installations have been made by 70 different railroads! The Spicer Railway Generator Drive consists of a very simple application of long-lived hypoid gear and pinion mounted on the standard axle. The drive from the gears is positive and constant through Spicer Universal Joints and Propeller Shaft to the Spicer Automatic Clutch mounted between the generator and propeller shaft. This automatic clutch completely absorbs all shocks and disconnects the drive line in case of excessive overload, and also completely disconnects the generator at speeds below 8 miles per hour eliminating shock loads when cars are being shunted.

Write for illustrated literature.

The Spicer Railway Generator Drive is manufactured, sold and serviced by

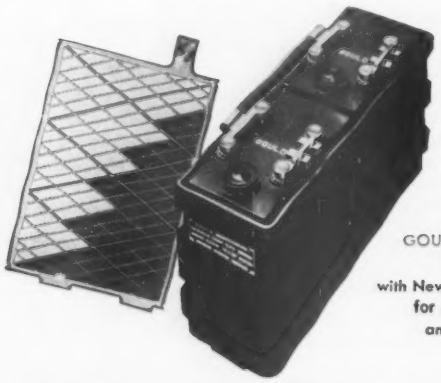
SPICER MANUFACTURING DIVISION
OF DANA CORPORATION
TOLEDO 1, OHIO

50 YEARS OF Spicer SERVICE

HIGH-LEVEL PERFORMANCE

THANKS TO BATTERY POWER!

Transportation is not enough. You've got to provide comfort. Passenger comfort *depends* on continuous high-level performance from your batteries. You get it with Gould Kathanode Air Conditioning and Car Lighting Batteries. The new Diamond "Z" Grids built into these batteries provide the high level power for today's high-rate compressors and other current demands. Increase car availability . . . cut maintenance costs . . . reduce yard charging . . . get utmost battery power dependability.



Specify
GOULD KATHANODE
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with New Diamond "Z" Grids
for Air Conditioning
and Car Lighting

GOULD *RAILROAD BATTERIES*

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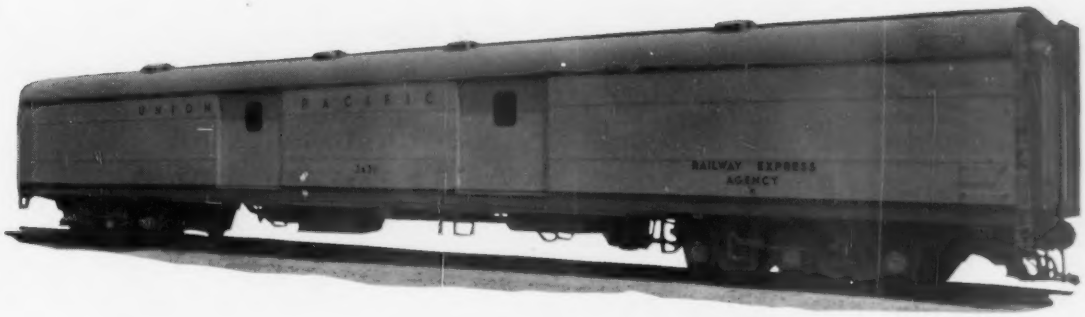
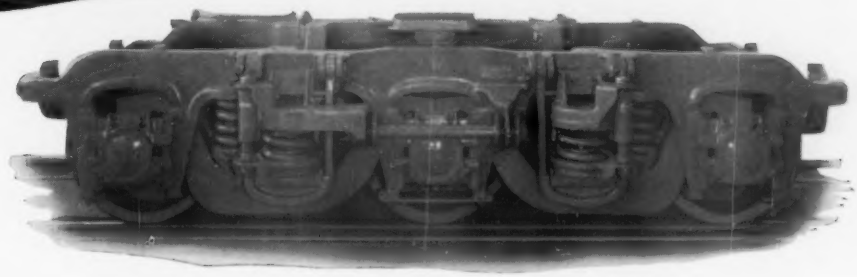


Built by A.C.F.

For the Union Pacific . . .



Six-Wheel Outside Swing Hanger Truck with All-Coil Springs.

33 New 85-Foot Baggage Cars

Thirty-three 85-foot Baggage Cars are now being delivered or on order for the Union Pacific Railroad, all equipped with latest design Commonwealth 6-wheel outside swing hanger type all-coil spring trucks and one-piece cast steel underframe ends with integral body bolsters and end sills. These new cars are for service in the Pacific Coast Streamliners, operating between Chicago and Los Angeles, San Francisco and Portland.

Commonwealth 4 or 6-wheel trucks with outside spring suspension provide the advantages of better riding cars, greater accessibility of parts for inspection and maintenance, and substantially lower upkeep costs.

Thoroughly proven on the leading railroads of America, Commonwealth outside swing hanger trucks are your finest value for better performance and maximum economy.

GENERAL STEEL CASTINGS

GRANITE CITY, ILL. EDDYSTONE, PA.

ELECTRICAL INSULATION IS OUR SPECIALTY

Q. *What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?*

A. UNITED STATES RUBBER COMPANY.

Q. *What ONE wire and cable producer makes plastics?*

A. "U. S."

Q. *What is the most important part of wire and cable?*

A. The insulation.

Q. *Who is best equipped to make wire and cable with superior insulation?*

A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.

Tapping rubber from one of the millions of trees on U. S. Rubber's giant plantations in Malaya.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U. S. Rubber.

SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

RAILROADS: Power Cables • Communications • Railway Signal • Royal Cords • Welding Cable • Railway Utility • Sup. Control • Weatherproof

UTILITIES: Power Cables • Street Lighting • Royal Cords • Network Cables • Utility Control • Pole & Bracket Cable • Service Entrance • Weatherproof • Zip Cord Pole Fixture Cable • Sup. Control

HEAVY INDUSTRY: Power Cable • Royal Cords • Welding Cables • Control Cables • Machine Tool Wire • Building Wire • Switchboard Wire • Thermostat Cable • Bus Drop Cable

Absolute Tops in OZONE MOISTURE HEAT Resistance

U. S. RUBBER'S BUTYL-INSULATED POWER CABLES

America's railroads depend on this cable for steady power distribution and for general-purpose wiring on circuits up to 8000 volts between phases and at conductor temperatures up to 80 C. The insulation will not crack after four hours in air containing 0.015 per cent ozone. Light in weight, easy to install and join, resistant to oil, heat, sunlight, flame, acids, alkalies and corrosive chemicals. The following are guaranteed test values:

PHYSICAL AND AGING PROPERTIES (MINIMUM VALUES)

	Butyl Insulation			Neoprene Jacket	
	Unaged	After 168 Hrs. in O.B. at 80 C.	After 7 days in Air Oven at 250 F.	Unaged	After 96 Hrs. in O.B. at 70 C.
Tensile, lbs. per sq. in.	600	500	400	1800	1600
Elongation, per cent	400	350	350	300	250

MOISTURE RESISTANCE (MAXIMUM VALUES)

a. Dielectric constant and power factor of insulation after immersion in water at 50 C.

Dielectric constant, one day	4.0
Per cent gain, 1 to 14 days	2.0
Per cent gain, 7 to 14 days	1.0
Power factor, one day, per cent	2.0

b. Mgs. per sq. in., 7 days at 70 C. 15.0

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SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

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CABOOSE CAR TRUCKS

BARBER-BETTENDORF

Swing Motion

CABOOSE CAR TRUCKS

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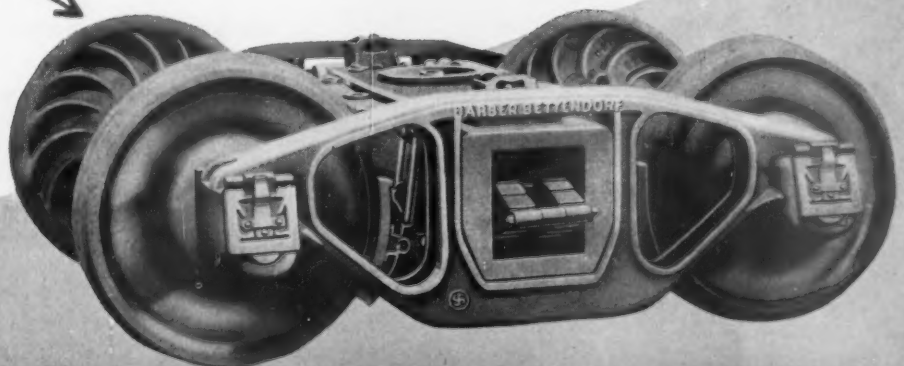

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No. 1

WITH

Self-locking nut for use with all sizes of common nuts.

No. 2

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Self-locking nut—used alone. Most economical for small bolts.

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LOCK NUTS

A standard nut with locking threads. For all sizes.

Years of service prove that the M-F lock nut gives you *more net ton miles* per car because it cuts shopping time, *keeps equipment rolling!*

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Dependability that never fails...

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Know-how of an unequalled staff of specialists...and the

Experience gained from almost a century of manufacturing for the transportation industry.

THE

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Established 1857 • ELKHART, INDIANA
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Yes, the ADLAKE name is a pledge of quality...and The Adams & Westlake Company has always kept faith with its customers. No effort is spared to make sure that every customer gets precisely what he bargained for...that he is completely satisfied.

Manufacturers of ADLAKE Specialties and Equipment for the Transportation Industry.

Adlake 97th year of serving the transportation and building industries

(*Continued from page 66*)

clockwise until backlash is correct (See Table of Clearances), as shown by dial indicator mounted so as to position indicator spindle perpendicular to a gear tooth. Ream dowel holes and tighten cap-screws.

953-Q.—What is the procedure for disassembling the circulating water pump?

A.—Remove self locking nuts on the back of volute casing and remove casing. Remove cotter pin and unscrew impeller shaft lock nut.

954-Q.—How is the impeller removed?

A.—With a puller, using the two tapped holes provided for this purpose.

955-Q.—What is the next operation?

A.—Remove the water seal by sliding it off the shaft towards the suction end. Remove lock wire and nuts from seal plate and withdraw plate towards the suction end. Remove the two set screws in each hole on the slinger hub and withdraw it from the shaft toward the suction end.

956-Q.—What should follow?

A.—Remove the lock wire from the capscrews in the thrust bearing retainer at the spline end and remove the capscrews and retainer. Remove the entire shaft from the drive end, with bearings still intact, from the bearing frame.

957-Q.—Does this action remove the oil seal?

A.—The oil seal will remain in the bearing frame because it is a press fit on the outer diameter and a running fit on the inner diameter.

958-Q.—How may the seal be removed if necessary?

A.—Use a long rod and tap it from its seat toward the suction end.

959-Q.—How is the radial bearing removed?

A.—Toward the suction end by the use of a puller.

960-Q.—What is the final operation at the spline end of the shaft?

A.—Loosen the ball bearing lock washer and remove the ball bearing lock nut and thrust bearing.

Schedule 24 RL Air Brakes

1637-Q.—What is peculiar about the design of relay *U*.

A.—The relay is so designed that it will remain in the energized position for a short time after the supply circuit is opened.

1638-Q.—What visual indication is thus brought about?

A.—The white light will be illuminated.

1639-Q.—What is the result if another pulse of current is not supplied to the coil of relay "U" before expiration of its time delay?

A.—The relay will become de-energized and thus illuminate the red lamp.

1640-Q.—In summing up what does the above description illustrate?

A.—The means used for converting the basic Wheatstone bridge into a device which not only measures the resistance of a train line circuit, but also insures that the bridge itself is operating as intended.

1641-Q.—What is this system used for?

A.—For checking the integrity of the electro-pneumatic brake circuits when the brakes are released.

1642-Q.—Can the integrity of the electro-pneumatic brake circuits be checked while the brakes are applied?

A.—Yes, as illustrated by Plate 4.

1643-Q.—What is the situation after the straight air pipe pressure has been brought up to the desired level?

A.—Only the release magnet valves throughout the train are energized by means of the master controller.

1644-Q.—In consequence, what is the value of the current flowing through the release wire and through the common return wire?

A.—This value is proportional to the number of vehicles in the train.

1645-Q.—How is the voltage drop thus affected?

A.—Consequently, the voltage drop across the resistor (Fig. 4) will also be proportional to the number of vehicles in the train.

1646-Q.—If a means is provided to maintain the current in relay "Q" just above its release value for all lengths of trains, when would the relay be de-energized?

A.—Any reduction in current due to open circuits which will disconnect some of the *21-B*-magnet valves would result in this de-energization.

1647-Q.—What acts to hold relay *Q* in its energized position?

A.—The rheostat shown in Fig. 4 is so designed that for any given train length, the setting of the rheostat is such as to supply the proper amount of current to the relay to hold it in its energized position.

1648-Q.—Is this true under any circumstance?

A.—No. This is true only if the number of 21-B magnet valves in the train correspond approximately to the dial setting of the rheostat. Relay *Q* is thus held energized and its front contact closed.

1649-Q.—What is the result when this condition exists?

A.—Battery current is supplied to relay *U* to hold it in its energized position.

1650-Q.—What must the condition be in order to accomplish the above?

A.—Relay *U* should already be energized when the brakes were released.

1651-Q.—How is this accomplished?

A.—By supplying battery current to the coil of relay *U* through its own front contact, as well as through the front contact of relay *Q*.

NEW DEVICES

One switch (left) puts the Moduzone heating system into automatic operation. The thermostat (center) in the overhead duct anticipates changes in outside air temperature. The 968 regulator (right) can be changed out in 15 min. by loosening four steam pipe unions and one electrical plug.

New Heating System Is Easy to Service

In less than five minutes a coach yard electrician can check over the new Vapor Moduzone heating system in the L&N's new de luxe sleeping cars. Two Vapor mercury contact thermostats and three 968 Vapor steam regulators are the major controlling parts of this new system. One thermostat controls overhead heat; the other is a body thermostat, controls heat to the floor radiators.

To make the terminal check, the coach man turns the one heat system switch on the control panel on and off and watches to see that the relay on the panel is working properly; this is indicated by operation of the single electrically operated valve in the 968 relay. With this o.k., he leaves the switch on, which calls for heat to the radiators, which he feels to see if they have warmed up. The remote control heat selector in one or two rooms is next turned to full on to see that the radiators in each room received steam.

This completes the testing, after which the room selector switches are placed in medium heat position. If the 968 regulator does not work properly, another can be installed in 15 minutes by breaking four steam pipe unions and one electrical plug.

The overhead heat control thermostat is located midway in the overhead duct and controls the steam from one regulator to the overhead radiation to keep the circulated air at a comfortable temperature. It is a sensitive plug-in thermostat, anticipating changes in outside temperature and consequently in the fresh air that is continuously added to the recirculated air. On mild days, the overhead system alone keeps the car warm. In cold weather, it is supplemented by the floor system.

The body thermostat located on the wall in the passageway controls two regulators, one for each side of the car. They feed steam into the unit finned floor radiation in the passageway, in the open section area and washrooms. These radiators are of different lengths requiring different amounts of steam for even heating. Hence the orifices in the new 949 Vapor valves are adjustable and can be set for different size radiators.

Turning the temperature selector in each room operates a cable that opens or closes a Vapor 947 needle valve on the radiator in that room. This valve gives positive manual control and eliminates electrical wiring from the thermostat to the control panel and valve.

Against the outer metal wall of the car on one or each side, are sensitive skin thermostats that compensate for differences in temperature between the sunny side of the car and the shady side. These work with the body thermostat in the passageway, so more heat is directed to the cooler side without overheating the sunny side.

Steam pressure from the trainline under the car is reduced to 8 to 12 lb. pressure by the 968 Vapor safety steam regulators under the car. The regulators are automatically controlled by the thermostats; however, in case of emergency, manually operated valves direct low pressure steam into the heating system.

One of the 968 regulators feeds steam at a constant 2-lb. pressure to the wash water heat exchanger, so there is ample warm wash water even though steam is not needed for warmth. Another of the three regulators feeds steam only to the overhead radiator in the duct.

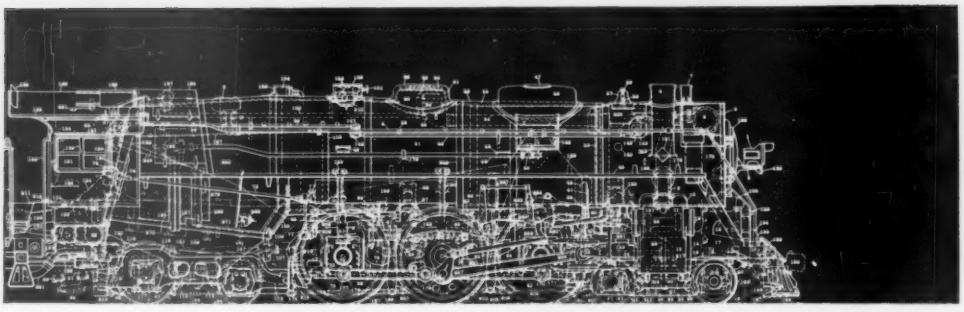
By using the new Moduzone heating system with manually operated steam admission valves in the rooms, much expensive wiring between the control panel, the thermostats and solenoid valves in each room, has been eliminated. The number of thermostats has been cut from 15 to 18 per car down to two, which also cuts out an equal number of relays on the heat control panel. The number of steam regulators, reduced from four or five to three, cuts down piping and additional wiring.

One switch puts the Moduzone heating system into

(*Continued on page 76*)

350 ways to spend money in 1954

. . . in maintaining your present steam motive power



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TRAIN MASTER

Leader in today's trend toward more powerful . . . more efficient Diesel Motive Power.

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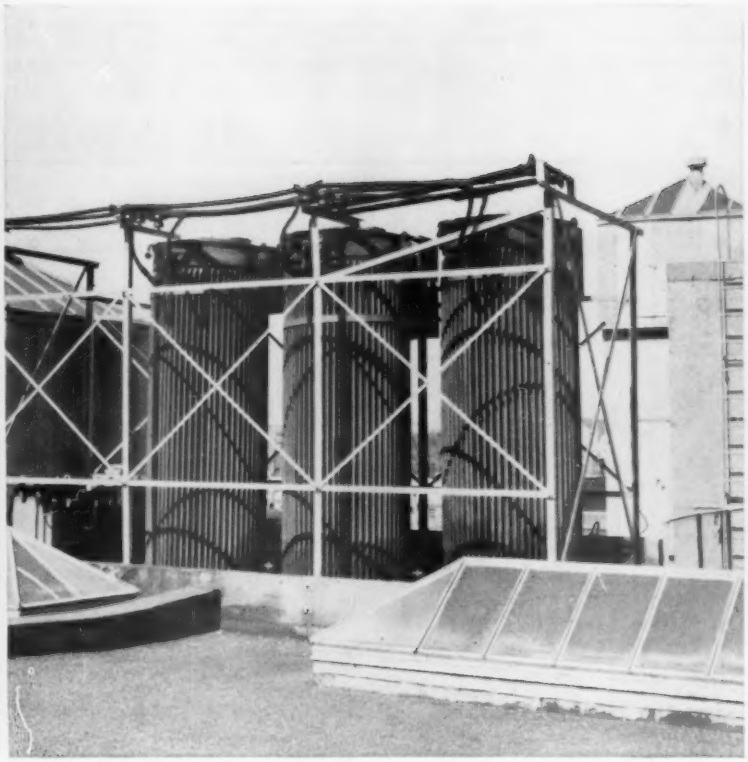
So Much Depends Upon So Little



Make a quick guess, and figure how much money it would cost if the high voltage power distribution system in your repair shops failed. Quite a sizable amount, isn't it?

That's what we mean by "so much depends upon so little." Sure, comparatively speaking, power cable is only a small part of the total cost of the plant. But when a cable failure occurs, the price of the shutdown can far exceed what you'd pay for dependable Simplex-ANHYDREX XX High Voltage Feeder Cable.

Why gamble with power cable cost? For practically the same price as ordinary cable, Simplex-ANHYDREX XX Cable provides you with:

√ Exceptional resistance to: Heat — Aging — Ozone — Oxidation.

√ Added to these advantages, NO Simplex-ANHYDREX Cable HAS EVER FAILED due to water absorption.

Because "so much depends upon so little," specify Simplex-ANHYDREX XX Cables for the high voltage power distribution system in your roundhouses, diesel shops, car rebuilding shops, etc. You can depend on Simplex-ANHYDREX XX Cables.

Simplex WIRES & CABLES

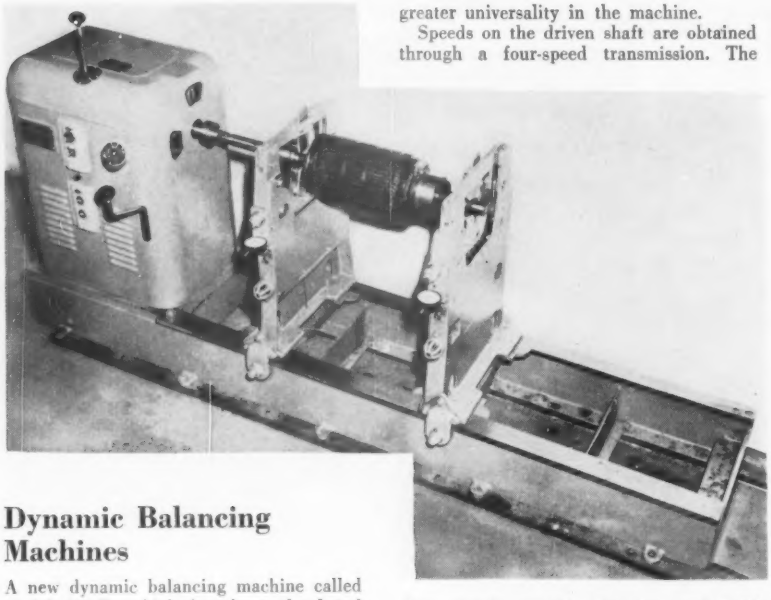
SIMPLEX WIRE & CABLE CO.

79 SIDNEY STREET, CAMBRIDGE 39, MASSACHUSETTS

(*Continued from page 73*)

automatic operation. The heat control panel is installed in the lower part of the car's electric locker so that radiant heat from other electric equipment does not pass over the wiring.

These 29 new Pullman-Standard sleepers for the L&N, the C&EI, and the NC&St.L are the first to be equipped with the Moduzone heating system, which was worked out jointly between Vapor and Pullman for installation on new cars as well as older sleepers being modernized.



Dynamic Balancing Machines

A new dynamic balancing machine called model 353-R, which has been developed by the Bear Manufacturing Company, Rock Island, Ill., features refinement and universality. Machine specifications include a shaft diameter range of ½ in. to 5 in., weight capacity of 10 lb. to 600 lb., 40 in. swing diameter capacity, and extra bed length in sections of the bolt-on type. Dual pick-up controls (automatic and manual for production and laboratory balancing), Dual number drum openings for vertical or horizontal correction, and redesigned flexing head and roller assemblies promote greater universality in the machine.

Speeds on the driven shaft are obtained through a four-speed transmission. The four speeds are 365, 535, 935 and 1,500 r.p.m. respectively. Variable speed drive is available if required. The machine is driven by a three-hp. motor. The spark indicating mechanism is operated from an eight-volt, secondary through a transformer having the same primary voltage as the motor. Dial indicator gages are full-jeweled.

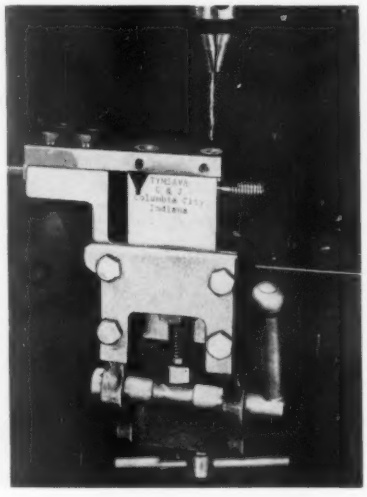
The bed length is six ft. Additional lengths are available in two, four, six, and eight-ft. sections. Adjustable towers give 4 ft. 6 in. width capacity.

Cross Drill Work Holding Fixture

This fixture, called Tymsavr, can be clamped to the swing table of ordinary drill presses, providing a standard set-up for most any production cross-drill job. Made by C & J Screw Machine Products, Inc., Columbia City, Ind., the device has two drill holes in the bushing plate which accommodates standard, hardened drill bushings. These bushings are interchangeable up to ⅜ in. drill hole size.

An adjustable end-stop is provided to acurately position the work lengthwise. Its move-back range allows holes to be drilled as far back as 1⅞ in. from the end of the work piece. Extra long stock can be placed across the unit's V-block.

Work is held up against the drill bushings by the movable V-block. The fixture will handle stock from 3/16 in. to 1 in. in dia. V-blocks are interchangeable to allow set-up production drilling of hex, flat, square stock.



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Steel Cutting Cemented Carbide

A heavy-duty steel cutting cemented carbide, named Grade 370, that is said to step up machining operations by as much as 30 per cent has been announced by the Carboloy Department, General Electric Company, Detroit 32, Mich. It was developed for taking heavy cuts at higher tool temperatures and provides a 50 per cent longer tool life than existing carbides.

Grade 370 is made with a built-in structural rigidity to resist high pressure and temperature deformation at temperatures of 1,800 deg. F.

The carbide is composed of tungsten carbide, titanium carbide, tantalum carbide and cobalt. It has a density of 12.60, and a Rockwell hardness on the A scale of 91.0. It is available in selected sizes and shapes.

■

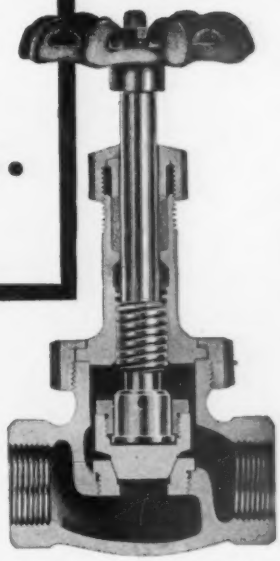
Reversible Air-Operated Nut Setters

A new series of 24 light-weight, air-operated, reversible screw drivers and nut setters has been announced by Thor Power Tool Company, Aurora, Ill. These latest additions to the Thor No. 2 line of air tools feature reversible motors to permit the tool's use for removing threaded fasteners as well as applying them, and for speeding inspection, testing, service and repair of all assembled products.

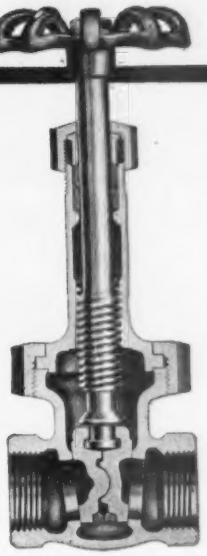
The new Thor reversibles are available in four basic speeds, ranging from 475 to 2,000 r.p.m. Each is offered with either slip clutch (for exacting tension control) or positive clutch (manual control). A further option of lever throttle or pistol

(*Continued on page 78*)

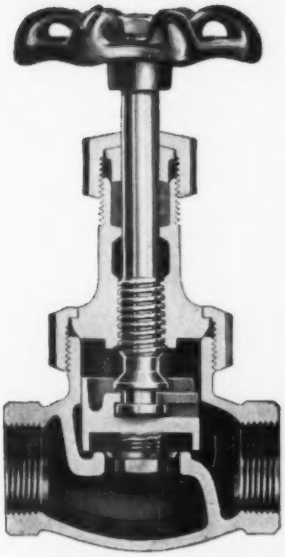
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

WALWORTH
valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

(*Continued from page 76*)

type throttle is offered for all types. Eight additional models feature a 25 per cent slip clutch drive, raising the total to 24 variations of the basic tools. Their weight is 2 lb.

■

Spot Welding Gun

The Aircospot Gun, a new development of Air Reduction Sales Company, 60 East 42nd street, New York 17, is now available. It is a lightweight spot welding gun which uses a 3/32-in. non-consumable thoriated tungsten electrode and an inert-gas shield. It makes welds on stainless steels, mild steels and alloy steels, without the aid of jigs or fixtures.

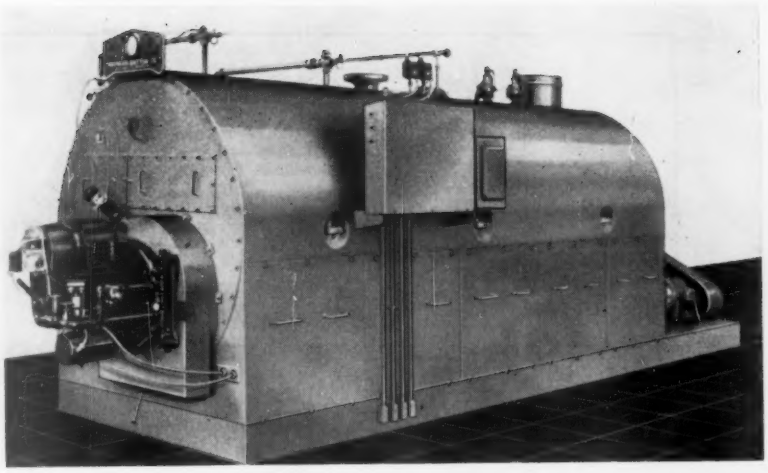
The unit consists of a hand gun, control panel and all necessary hose and cable assemblies. A standard d.c. power source, either motor generator set or rectifier type of machine, is required. The gun is water-cooled, and uses helium or argon, or a mixture of the two, for a shield. High frequency is not required. The Aircospot gun is rated at 250 amp. and welds may be made on sheet metal up to ⅛ in. in thickness. The bottom section can be of greater thickness. In most cases, a back-up plate is unnecessary.

The operator need only position the top sheet on the piece to which it is to be joined, position the gun and pull the trigger. The operation is completed in approximately one second.

■

Automatic Packaged Boiler

The EconoTherm Boiler, featuring off-center firing and water circulation in a rotary motion, has been developed by Dutton Boilers, Division of Hapman-Dutton Company, Kalamazoo, Mich. They are

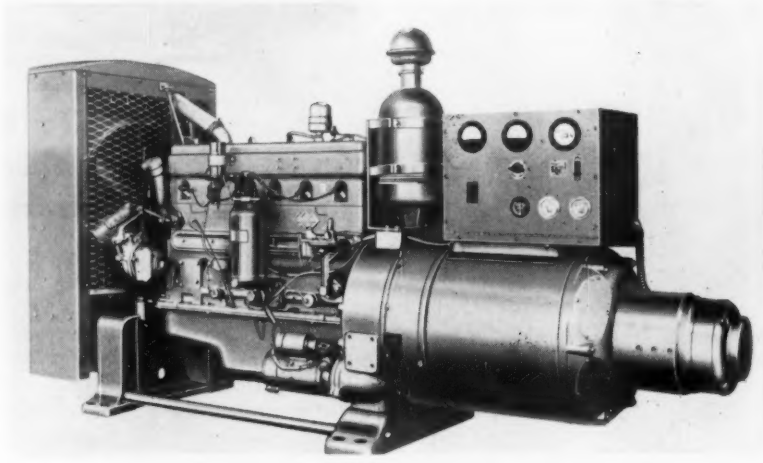


available in sizes through 250 hp.

Off-center furnace location provides a high column of water over the hot furnace to increase safety factor and prevent against low water damage. Steaming is said to be faster with elimination of surging and priming.

An induced draft fan pulls gases through boiler, eliminating need for a high stack. Secondary air is induced through a stainless steel air ring to create a rotary turbulence in the furnace which produces intense fire over the heating surface.

Boilers are available for gas only, light oil only, heavy oil, or with gas and light oil combination for conversion.



50-Kw. Electric Plant

D. W. Onan & Sons, Inc., Minneapolis, Minn., announces a new 50-kw., 62.5-Kva. electric plant Model 50KA. The International Harvester gasoline engine delivers 104 hp. at 1,800 r.p.m. and has a 450 cu. in. piston displacement. It is equipped with replaceable cylinder liners, roto x-haust valves, oil bath air-cleaner and a remote, 12-volt starting system. Water-cooling, full-pressure oil lubrication with a sump capacity of nine quarts and a low oil pressure cut-off to protect the engine are other features of the engine.

The Onan-built generator is of drip-proof design, direct-connected to the engine for permanent self-alignment. Voltage regulation is plus or minus two per cent. An improved brush rig design features constant-pressure brush springs.

The control box, mounted over the generator, is equipped with a charge rate ammeter, electric water temperature gage, electric oil pressure gage, start-stop buttons and running time meter. An automatic voltage regulator is installed inside the control box.

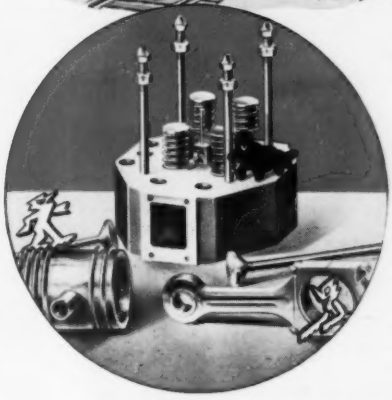
■

Always-Charged Battery Light Source

Two auxiliary lighting units approved by Underwriters Laboratories are now available in a new and completely redesigned line of 6-volt emergency lighting equipment, made by the Electric Storage Battery

(*Continued on page 93*)

WEARMITES AHEAD...
PROCEED WITH CAUTION!



On the main line or in the yards, your Diesel engines are constantly faced with the ever-present menace of WEARMITES ... Grit, Dust, Dirt and Tarry Sludge. Lubricating oil and Fuel oil must be freed of these engine-destroying contaminants if costly repairs and down time are to be avoided.

WIX ENGINEERED FILTRATION is the practical, effective and economical means for combating WEARMITES in your Diesel equipment. With WIX Cartridges in your Diesel Filters, you are assured a constant flow of continuously cleaned oil ... cleaned better ... kept clean longer. And you may select the filtrant indicated as best for the type of service condition such as: long haul, through run, stop-and-go branch line or yard work.

Write for particulars on how your road can save lubrication dollars with WIX ENGINEERED FILTRATION.

Precision construction ... controlled density ... uniform quality ... self-contained sealing gaskets ... a filtrant best suited to the service and many other WIX *plus* features add up to WIX Engineered Filtration. Whether for Lubricating or Fuel Oil, crush-proof, non-collapsible WIX Filter Cartridges show a decided dollars and cents advantage for you.

ENGINEERED FILTRATION

wix
TRADE MARK REG.

LUBE **FUEL**

RAILROAD OIL FILTERS

WIX CORPORATION · GASTONIA, N. C.

WAREHOUSE STOCKS IN: GASTONIA • ATLANTA • CHICAGO • NEW YORK • ST. PAUL • ST. LOUIS • SACRAMENTO

NEWS

Sillcox A.S.M.E. President

DR. LEWIS K. SILLCOX, honorary vice-chairman of the board of the New York Air Brake Company, was elected president of the American Society of Mechanical Engineers for 1954 during the society's 74th annual meeting, held, New York, November 30—Dec 4, inclusive.

Dr. Sillcox, who was born at Germantown, Pa., in 1886, has been identified with the transportation industry since he began his career in 1903 as railroad foundry apprentice. From 1918 to 1927 he was general superintendent motive power of the Chicago, Milwaukee & St. Paul, becoming first vice-president of New York Air Brake in the latter year. In 1948 he was elected a director of that company; in 1949, executive vice-president; in 1952, vice-chairman of the board; and, in June 1953, honorary vice-chairman. From 1934 to 1936 he was chairman of the Mechanical Advisory Committee to the Federal Coordinator of Transportation.

Dr. Lewis K. Sillcox

Dr. Sillcox, who has been instrumental in many developments in railroad air-brake equipment and usage, has been a contributor to many technical publications, and a lecturer on transportation and economics at a number of the country's leading universities. He holds the gold medal of the Institution of Locomotive Engineers of Great Britain (1945).

He is a Fellow of the A.S.M.E., of which he has been a member since 1916. In 1943 he was awarded the A.S.M.E. medal for distinguished service in engineering and science, and in 1946 was elected an honorary member of the society.

A.S.M.E. Railroad Division Installs New Officers

AT the annual luncheon of the Railroad Division, American Society of Mechanical Engineers, in New York December 3, E. M. Van Winkle, vice-president, American Steel Foundries, New York, was elected chairman for 1954.

Other Executive Committee members for the year are C. K. Steins, mechanical engineer, Pennsylvania; J. S. Newton, vice-president, engineering, Baldwin-Lima-Hamilton Corporation; A. G. Hoppe, mechanical engineer, Chicago, Milwaukee, St. Paul & Pacific; T. F. Perkinson, manager, Transportation Engineering division, General Electric Company. E. L. Woodward, western editor, Railway Locomotives and Cars, continues as secretary.

New members of the General Committee include G. L. Cotter, director of engineering, Westinghouse Air Brake Company; P. V. Garin, engineer of tests, Southern Pacific, and Charles Kerr, consulting transportation engineer, Westinghouse Electric Corporation.

A.A.R. Road Tests Fitted Journal Bearings

In connection with its current hot-box studies, the A.A.R. Mechanical Division is collaborating with the Merchants Despatch Transportation Corporation in a test of fitted journal bearings applied to refrigerator cars. The cars with these bearings now being turned out of the shop

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of August 1953	Month of August 1952	8 months ended with August 1953	8 months ended with August 1952
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	12,741	16,679	100,214	137,607
3-06	Total, Diesel-electric	32,207	28,242	248,154	213,782
3-07	Total, electric	722	735	5,875	6,036
3-04	Total, locomotive-miles	45,746	45,715	354,751	357,637
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,740	1,722	13,332	12,914
4-06	Empty, total	936	890	7,308	7,094
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	24,382	30,046	180,416	242,503
6-02	Total in oil-burning steam locomotive trains	6,077	8,778	48,543	65,527
6-03	Total in Diesel-electric locomotive trains	91,149	80,652	694,292	590,801
6-04	Total in electric locomotive trains	2,061	2,075	16,622	16,790
6-06	Total in all trains	123,903	121,736	941,555	916,402
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.03	1.03	1.03	1.03
10-02	Loaded freight car-miles	41.30	41.30	40.80	39.50
10-03	Empty freight car-miles	22.20	21.30	22.30	21.70
10-04	Total freight car-miles (excluding caboose)	63.50	62.60	63.10	61.20
10-05	Gross ton-miles (excluding locomotive and tender)	2,941	2,915	2,879	2,805
10-06	Net ton-miles	1,365	1,364	1,308	1,288
12	Net ton-miles per loaded car-mile (M-211)	33.00	33.10	32.10	32.60
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	65.00	65.90	64.60	64.50
14	Averages per train hour (M-211):				
14-01	Train miles	18.00	17.40	18.20	17.60
14-02	Gross ton-miles (excluding locomotive and tender)	52,212	50,169	51,746	48,817
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	46.40	45.40	45.70	44.20
14-02	All	44.20	43.00	43.50	42.00
15	Average net ton-miles per freight car-day (M-240)	950	936	902	882
17	Per cent of home cars of total freight cars on the line (M-240)	44.50	44.00	46.40	44.20

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	3,888	6,242	35,827	56,602
3-06	Diesel-electric	20,888	19,441	161,020	148,066
3-07	Electric	1,514	1,615	12,352	13,042
3-04	Total	26,291	27,298	209,199	217,718
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	268,818	277,168	2,113,496	2,172,197
4-09	Total in coal-burning steam locomotive trains	20,965	31,266	202,219	291,323
4-10	Total in oil-burning steam locomotive trains	14,915	26,327	122,294	207,147
4-11	Total in Diesel-electric locomotive trains	216,487	201,800	1,652,008	1,529,447
12	Total car-miles per train-miles	9.86	9.92	9.79	9.77

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	605	740	4,805	6,460
1-02	Steam, oil-burning	99	161	885	1,323
1-03	Diesel-electric[1]	3,537	3,247	27,465	24,754
1-06	Total	4,259	4,172	33,317	32,724
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	19	24	166	229
2-02	Steam-oil-burning	6	10	53	87
2-03	Diesel-electric[1]	258	259	2,052	2,050
2-06	Total	314	326	2,528	2,633
3	Hours per yard locomotive-day:				
3-01	Steam	7.20	6.80	6.80	6.80
3-02	Diesel-electric	16.20	16.00	16.30	16.00
3-05	Serviceable	15.10	14.50	14.90	14.10
3-06	All locomotives (serviceable, unserviceable and stored)	13.50	12.40	13.10	12.20
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.70	1.68	1.73	1.75
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	0.72	0.73	0.74	0.75

[1]Excludes B and trailing A units.

PRODUCTION RESUMED IN 3 DAYS

after $1,000,000 fire at C&D Batteries, Inc.

C & D President, Leon A. Doughty pulls switch to start charging operations.

C & D's block-long plant in Conshohocken, Pa. at the height of the fire, Sunday, November 29.

Despite a $1,000,000 fire that destroyed the main buildings, offices, engineering department, and laboratory of C & D's plant on Sunday, November 29, 1953, production was resumed in three days.

On Tuesday, December 1, space was leased in a nearby plant for setting up new production facilities. On Wednesday, December 2, new batteries that had escaped the fire were being charged on new lines, and grid casting was begun next morning.

The new facilities were in operation on December 10. The salvaged portions of the main plant and the leased facilities were combined to achieve full production by Christmas.

We thank our customers for their patience in bearing with us during delays in shipping, and assure them that the high quality of C & D products is being maintained. *We are deeply grateful to our many friends who have generously given us their kind understanding and support.*

Philadelphia Inquirer Photos

Two Men Seized in Bakery Holdup

Two holdup men were captured by police late last night, within 15 minutes after they robbed a bakery, on Dryrum ave. near Oster st., of $122.

The robbery occurred in Vern's Bakery, at 9718 Dryrum Aven... men... the place at 10:35 P. M. The younger one held his hand in ... coat pocket...

Auto Strikes Man Carrying Box

A man carrying a bo... 93rd st. near Putnam ... short... afte...

C&D BATTERIES, INC.

of Conshohocken, Pa.

SALES AND SERVICE OFFICES IN PRINCIPAL CITIES FROM COAST TO COAST

30 M... Stick

PAN... day) (... Korea... refused ... ing to ... resiste... tion.

It w... home" ... have ... man. AWA... W... more ... cans ... M... B. O... Cor... sio... nc... pa... in ... l... toda... the ... fate ... conf... TA... E... conf... A... the ... on ... p...

and placed in regular interchange service, are in the following series: 300 NRC Cars, 16,500 to 16,799, incl.; 700 MDT Cars, 12,000 to 12,699 incl.

All of these cars are stenciled over the bolster above the repack date with the following legend: "A. A. R. Test 202. If journal bearings are removed retain and notify owner." It is requested that the M. D. T. office be advised as to the cause of removal in order that sufficient data can be accumulated to show the relative merits of the fitted vs. standard journal bearings as well as the effect of lining journal bearings with Satco metal. It is also urged that any pertinent data on the condition of the bearing and journal which may be helpful in an evaluation of this design be reported when renewing bearings.

M.B.M.A. Report—A Correction

In reporting the September 1953 annual meeting of the Master Boiler Makers' Association in the November 1953 issue, page 66, both G. L. Ernstrom, general mechanical superintendent, Northern Pacific, and H. R. Barclay, general boiler inspector, Northern Pacific, were assigned by error to the Great Northern. J. L. Robson is chief mechanical officer of the GN.

Coordinated Mechanical Association Exhibit

Coordinated Mechanical Associations' conventions, to be held at the Hotel Sherman, Chicago, September 13 to 15, 1954, will be accompanied by an exhibit of railway equipment and supplies. The exhibit, sponsored by the Allied Railway Supply Association, will be opened Sunday afternoon, September 12, for the benefit of early arrivals.

Miscellaneous Publications

LOADING DEFENSE MATERIAL ON OPEN-TOP CARS.—Pamphlet MD-7 Published by the Association of American Railroads, 59 East Van Buren street, Chicago 5. 303 pages, 5 in. by 7½ in., paper bound. $0.46 a copy; $40 a hundred. An up-to-date revision of present loading methods for U. S. Department of Defense shipments. Contains necessary general rules, loading information and 100 figures covering practically all defense commodities shipped in open-top equipment. The loading methods formulated cover a number of new items, some of which have given trouble en route due to previous loading methods being inadequate. Many of these instances have been brought to the attention of the Loading Rules Committee by both the carriers and the Department of Defense and the new and revised loading figures are expected to eliminate a great percentage of the trouble experienced. The new figures cover various types and sizes of trailers, new model tanks, buoys, boat cradles, sectional barges, straddle trucks, rock crushers and other types of road making equipment; and jet, rotary and helicopter engines in metal and wood containers.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
July, 1950	2,745,932,894	.....	.....	23,957	114,619
August, 1950	2,937,455,020	7,422	15,490	22,912	128,206
September, 1950	2,974,297,739	6,541	12,881	19,422	153,141
October, 1950	3,165,997,915	4,343	8,935	13,278	238,439
November, 1950	2,868,871,913	2,536	5,331	7,867	364,672
December, 1950	2,813,042,212	2,278	5,968	8,246	341,140
January, 1951	2,840,847,511	2,870	8,436	11,306	251,269
February, 1951	2,425,226,454	4,528	14,063	18,591	130,452
March, 1951	3,063,173,942	3,667	10,078	13,745	222,857
April, 1951	2,996,562,763	3,702	8,914	12,616	237,521
May, 1951	3,013,634,782	5,631	13,737	19,368	155,599
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,435	9,818	290,359
May, 1953	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953	2,672,512,889	8,466	14,495	23,833	116,394
July, 1953	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953	2,971,020,484	8,638	14,160	22,798	130,319
September, 1953	2,822,222,832	6,083	10,195	16,278	173,376

SUPPLY TRADE NOTES

HUNTER ILLUMINATED CAR SIGN COMPANY AND HUNTER SASH COMPANY.—An office has been opened at 80 East Jackson boulevard, Chicago, for sales, service and engineering in the Middle West area. *Charles A. Brooks* is in charge of the new office.

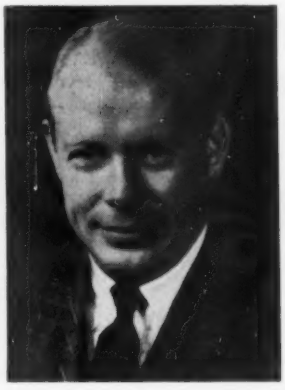
■

BALDWIN-LIMA-HAMILTON CORPORATION, STANDARD STEEL WORKS DIVISION.—*Fred E. Greger,* has been named sales manager at Burnham, Pa. Mr. Greger has been western sales manager for the Hamilton division of the company at Chicago since 1950.

CONTINENTAL-DIAMOND FIBRE COMPANY. —*O. E. Anderson* has been appointed technical service representative for Silicone, Teflon and Polyester flexible sheet and tape products. Mr. Anderson was with the Micarta division of Westinghouse Electric Corporation for more than 24 years.

■

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.— *A. M. Miers,* manager of the design division—engineering department, at the Pullman Car Works at Chicago, has been appointed manager—sales and service engineering division, of Pullman-Standard.



F. E. Greger

A. M. Miers

Here's Why You Get

LONGER ROAD LIFE

with

Magnus Traction Motor Support Bearings

The extra precision that goes into Magnus Traction Motor Support Bearings means extra trouble-free mileage on the road. It begins with the careful selection and testing of the metal mixes and follows through with the most exacting quality control in every step of manufacture.

Here are some of the outstanding features of these High Mileage bearings:

- ***Perfectly Mated Bearing Halves*** – precision matched under load to assure uniform wall and flange thickness, parallel ID and OD.
- ***Satco Lining Metal,*** centrifugally applied, gives greater resistance to wear and load, plus stronger bonds and increased hardness at high temperatures.
- ***Interchangeable Double Keeway*** – permits bearings to be used interchangeably on either commutator or pinion shaft ends.
- ***Precision Finish Boring*** to extremely close tolerances on specially designed machines – another contribution to long, trouble-free performance.
- ***Hi-Strength Backs*** – made from high tin, fine-grained wearing metal mixes that are Magnus-guaranteed.

For complete information, send for your copy of Bulletin No. 6000. Just write a post card or letter to Magnus Metal Corporation, 111 Broadway, New York 6, N.Y.; or 80 E. Jackson Blvd., Chicago 4, Ill.

It Pays to Play Safe!

Use only **NEW Magnus Bearings for Replacement Purposes**

• New High-Mileage Magnus bearings cost so little because of skilled production methods they can usually be furnished for *less* than the cost of rebuilding worn bearings. And only *new* Magnus bearings give *full* protection to your big investment in Diesel locomotives.

MAGNUS

High Mileage

TRACTION MOTOR SUPPORT BEARINGS

...for every type and make of diesel locomotive

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

NATIONAL MALLEABLE & STEEL CASTINGS CO.—*J. Lyle Thomas*, office engineer in the mechanical department of the Chesapeake

J. L. Thomas

& Ohio at Richmond, Va., has joined the railway division—sales of national Malleable with headquarters in Richmond. *William F. Beven*, formerly of Duncan & Beven who became associated with the railway division—sales, in September 1953, has now been assigned to the Chicago office.

W. F. Beven

■

BAKER-RAULANG COMPANY.—*John A. Matousek*, vice-president, manufacturing has been named vice-president and general manager. *Russell A. Moore* has been appointed field applications engineer, specializing in sideloading fork truck applications, and will be available as consultant on general materials handling problems. Mr. Moore was formerly group engineer for Bell Aircraft Corporation. The *St. Louis Railway Supply Company*, 2114 N. Second street, St. Louis, has been appointed a Baker-Raulang distributor in the St. Louis area.

■

GRAYBAR ELECTRIC COMPANY.—A Graybar branch has been opened at 923 Washington street, Portsmouth, Ohio, under management of *J. T. Young*.

■

NATIONAL WELDING EQUIPMENT COMPANY.—*Henry L. Pohndorf*, chief engineer, has been appointed also sales manager at San Francisco.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE DECEMBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVES

Road	No. of units	Horsepower	Service	Builder
Chicago, Milwaukee, St. Paul & Pacific	19	1,750	Road switch	Electro-Motive
	6 "A"	1,750	Freight	Electro-Motive
	6	1,200	Switch	Electro-Motive
	8	1,600	Road switch	American Locomotive
	5	1,000	Switch	American Locomotive
	8	1,600	Road switch	Fairbanks, Morse
	5	1,200	Switch	Fairbanks, Morse
	8	1,200	Switch	Baldwin-Lima-Hamilton
Fort Dodge, Des Moines & Southern	3[1]	.....	.....	General Electric
Louisville & Nashville	46[2]	1,600	General purpose	American Locomotive
	2[3]	1,600	Road freight	American Locomotive
	7[3]	1,750	General purpose	Electro-Motive
Southern Pacific	57[3]	1,750	.....	Not revealed
	16[3]	2,400	.....	Not revealed
	6[3]	1,200	.....	Not revealed

DIESEL-LOCOMOTIVE INQUIRIES

Virginian	25[4]	.....	.....	.....

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Canadian National	15	30-ton stock	Eastern Car
	15	50-ton air dump	Eastern Car
Chicago, Rock Island & Pacific	1[5]	125-ton depressed-center flat	Company shops
Erie	10[6]	50-ton box	Pullman-Standard
New York, New Haven & Hartford	3[7]	200-ton transformer	Company shops
Pennsylvania	20[8]	50-ton box	Pullman-Standard
St. Louis-San Francisco	600[9]	50-ton box	Pullman-Standard

PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Canadian National	30	Baggage	National Steel Car
Florida East Coast	2[10]	Sleeping	Pullman-Standard
	4	Coaches	Pullman-Standard
Northern Pacific	2[11]	Sleeping	Pullman-Standard

[1] Estimated cost, $85,000 each.
[2] Delivery expected during the first quarter of 1954.
[3] First 10 units delivered in December. Remainder to be delivered before August.
[4] For use in "mine switching and other heavy transportation work in the coal fields" at and west of Elmore, W. Va., where they will replace steam locomotives 30 or more years old. In asking for bids for new diesels, the railroad says it "must make this departure from the use of coal-burning locomotives . . . with reluctance," because the cost of operating existing steam locomotives "has increased to such an extent that their replacenent with efficient and economical motive power has become imperative" and "a modern coal-burning locomotive, suitable for work in the coal fields, has not been developed." Exact number, horsepower and type of the new diesels has not yet been determined.
[5] Body to be one-piece General Steel casting. Cost, $30,000.
[6] Estimated cost, $76,000. Delivery expected in first quarter of 1954.
[7] Cost, $150,000.
[8] To be equipped with cushion underframes.
[9] Approximate cost, $4,300,000. Delivery scheduled to begin in February.
[10] The F. E. C. has received court authorization to purchase the four coaches at a unit cost of $171,500, the two sleeping cars costing $194,350 each. The two sleeping cars, along with seven similar cars recently ordered by four other railroads (page 93 December), will operate in "Dixie Flagler" service between Chicago and Miami.
[11] Estimated cost, $222,890 each. Delivery expected in August.

Notes: *Great Northern.*—The Great Northern is preparing to order 22 dome passenger cars for its streamlined "Empire Builder" service between Chicago and Seattle and Portland, at a cost of more than $6,000,000. Plans call for four dome cars to be placed in each of the five train sets which provide the daily service. The remaining two cars will be used as spares.

ALUMINUM COMPANY OF AMERICA.—A new Alcoa color 16 mm. film, "Welding Advances with Aluminum," demonstrates the latest techniques in the welding of aluminum pressure vessels, using both the tungsten arc and consumable electrode methods. The basic concepts of these methods are explained in an animated sequence. Described and illustrated also are the services of the research and process development facilities offered to customers for the solution of their welding problems. The film, which has a running time of 28 min., can be borrowed for group showings. Requests should be made on business letterhead to Motion Picture Section, 818 Alcoa building, Pittsburgh 19.

■

WESTINGHOUSE AIR BRAKE COMPANY.—*Earl D. Hilburn* has headquarters staff in the newly created office of vice-president, government contract service. For the past five years Mr. Hilburn has been director of engineering services for Melpar, Inc., wholly owned research subsidiary of the company.

J. E. Carroll

AMERICAN HOIST & DERRICK CO.—*John E. Carroll*, vice-president of sales, has been elected president, succeeding *Harold O. Washburn* who has been elected chairman of the board.

(*Continued on page 87*)

Minimize uneven wear with

Speer MULTIFLEX Brushes

There's a Speer Application-Tested Brush for every railroad use:

Traction Motors • Main Generators • Auxiliary Generators • Motor Generators and Dynamotors • Traction Motor Blowers • Exciters • Fuel Pump Motors

Speer MULTIFLEX* Brushes operate in single holders—yet they give all the advantages of double brushes.

Besides minimizing uneven wear, they . . .

IMPROVE COMMUTATION • REDUCE VIBRATION • HAVE LONGER LIFE

Reason: their patented two-section construction.

And like *all* Speer Brushes, MULTIFLEX Brushes are 2-way application-tested. First, by hours and hours of laboratory test-runs and, second, by thousands of miles of carefully observed, on-the-job operation.

Next time, get application-tested, double-brush advantages—in a single brush. Specify Speer MULTIFLEX.

*Patent No. 2,181,076

SPEER *Carbon Co.*

St. Marys, Pa.

Divisions: Speer Resistor
Jeffers Electronics
International Graphite & Electrode

LAB TESTED—Continuing research assures high quality...makes certain that Esso Railroad Products keep pace with latest engine design and developments.
PROVED on the RUN—Constant on-the-job checks by Esso Sales Engineers assure the dependable performance of all Esso Railroad Products.
612
LEHIGH VALLEY
Esso

ESSO DIESEL FUEL

Esso Diesel Fuel has been specially developed into a dependable, high-quality railroad fuel by years of research and testing. In one of the most exacting tests ever conducted Esso Diesel Fuel was proved on the run through over 300,000 miles of actual railroad operation. For sure, efficient, economical diesel fuel — be sure to specify Esso.

ANOTHER

DEPENDABLE ESSO RAILROAD PRODUCT

SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Penna., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

ESSO STANDARD OIL COMPANY — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa.—Baltimore, Md.—Richmond, Va. — Charleston, W. Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.

(*Continued from page 84*)

WESTINGHOUSE ELECTRIC CORPORATION.—*A. M. Harrison* has been named manager of the transportation and generator department of the transportation and generator division of Westinghouse Electric Corporation and *P. G. Lessmann*, assistant manager. Mr. Harrison has been manager of the transportation engineering department since 1952 and Mr. Lessmann was formerly engineering section manager.

■

BUFFALO BRAKE BEAM COMPANY.—*Stephen K. Peterson* has become sales engineer for southeastern territory. Mr. Peterson was previously field service representative in northeastern states for the Pullman-Standard Car Manufacturing Company. Prior to 1947 he was superintendent car department of the Seaboard Air Line.

■

CHICAGO RAILWAY EQUIPMENT COMPANY.—*F. W. Lewis* has been named engineering assistant to president, at Chicago, and *John Holden* has been appointed chief mechanical engineer at that point.

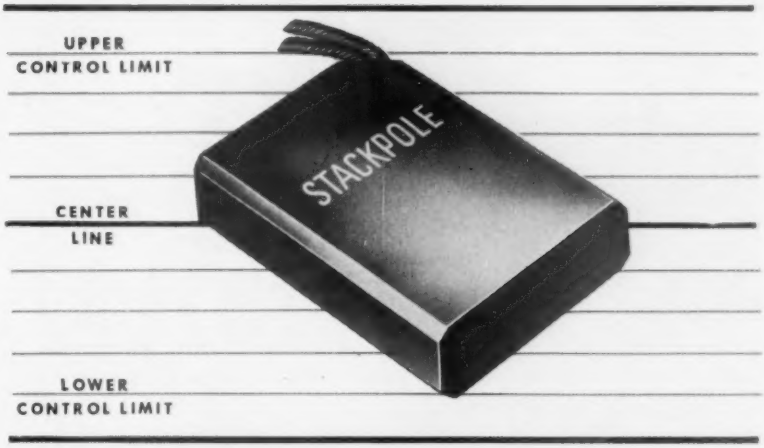
■

The OKONITE COMPANY.—*R. Stuart Keefer* has been elected president, and *Edward D. Youmans*, vice-president in

R. S. Keefer

E. D. Youmans

charge of research and product development. They were formerly, respectively, president, vice-president—sales, and vice-

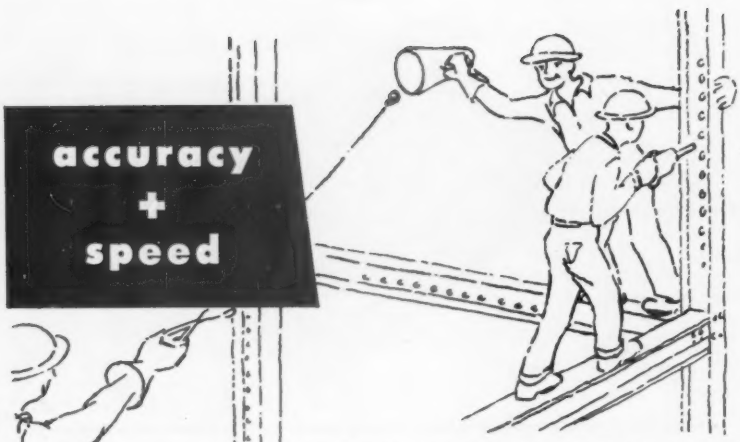


quality controlled...
for uniform dependability

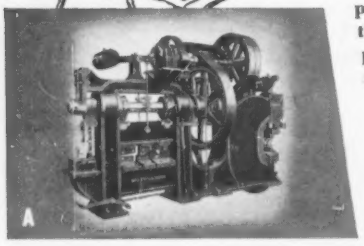
The uniform dependability of Stackpole Diesel Brushes is the direct result of long, specialized experience PLUS statistical Quality Control in every step of production. Stackpole Quality Control means that brush characteristics are kept at highly uniform levels—long life and minimum commutator wear are assured.

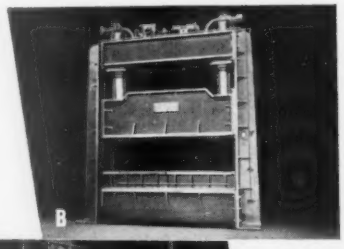
STACKPOLE CARBON COMPANY
St. Marys, ● Pa.
Carbon-Graphite specialists for over 30 years

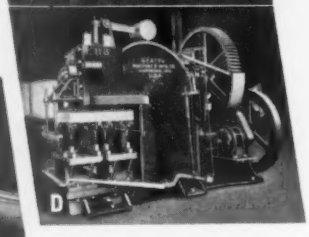
STACKPOLE
Diesel-Electric
BRUSHES

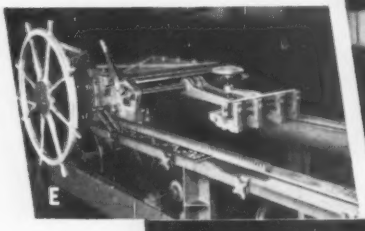


Hanging on to the "hot" ones often calls for maximum speed and accuracy. Therefore, structural steel fabricators must know they can rely on their men and machines. While men can vary, BEATTY machines are designed to always give you built-in speed and accuracy — plus the widest safety margin possible. If any of the machines shown isn't the answer to your particular production problem, BEATTY engineers can design and build to suit your exact needs.









A. BEATTY Co-Pun-Shear, one unit that does coping, punching and shearing without changing tools.

B. BEATTY Vertical Hydraulic Bulldozer for hot and cold pressing and forming of heavy metal.

C. BEATTY Press Brake and Flanger handles any type of bending, forming, flanging, pressing.

D. BEATTY Heavy Duty Punch that handles steel up to 65 ft. long. Punches webs, and flanges.

E. BEATTY Spacing Table handles beams, channels and plates with speed and precision.

BEATTY
MACHINE & MFG. CO.
HAMMOND, IND.

C. M. Kirkland

president—manufacturing and research. *Charles M. Kirkland,* factory sales manager at Passaic, N. J., has been appointed vice-president—sales.

■

GENERAL ELECTRIC CORPORATION.—*Kenneth G. Patrick* has been appointed manager of educational relations services at New York. He has been succeeded in his former position as manager of general public relations services by *J. Stanford Smith. Ralston B. Reid* replaces Mr. Smith as manager of advertising and sales promotion for the apparatus sales division, at Schenectady.

■

STANDARD RAILWAY EQUIPMENT MANUFACTURING COMPANY.—*Jean-Claude Lessard* has been appointed vice-president of

J-C Lessard

Standard's Canadian subsidiary, with headquarters at Montreal. Mr. Lessard recently resigned as deputy minister of transport and as chairman of the Canadian Maritime Commission.

■

AMERICAN CHEMICAL PAINT COMPANY.—The Detroit office has been moved to 10225 West McNichols Road, Detroit 21.

■

AUTOMATIC TRANSPORTATION COMPANY.—*William E. Johnson* has been appointed sales manager of the New York city branch

of Automatic Transportation Company, succeeding *George A. Hinckley*, transferred to Chicago as sales manager. Mr. Johnson was previously sales representative of the Yale & Towne Manufacturing Co. at New York.

■

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—*O. F. Brookmeyer*, for many years sales manager at LaGrange, Ill., retired on November 30. Mr. Brookmeyer was one of the pioneers in the establishment of train propulsion by internal combustion engines on American railroads.

Mr. Brookmeyer was born in Logansport, Ind., and received his early education there. He went with the Cleveland, Cincinnati, Chicago & St. Louis (Big Four) in 1905 and was superintendent of transportation at Indianapolis when he resigned to join the Electro-Motive Company at Cleveland, Ohio, as sales manager. While with the railroad Mr. Brookmeyer was active in the application of the gasoline-electric rail cars to some of the Big Four problems and in this experience became intrigued with the possibilities in the use of the internal combustion engine as railroad motive

O. F. Brookmeyer

power. He was instrumental in the establishment of Electro-Motive's early reputation for the successful application of the internal combustion engine to standard train propulsion. More than seven hundred Electro-Motive rail cars were sold under his direction before the organization presented the Diesel locomotive to the railroads. He directed the sales aspect of the introduction of diesel motive power on United States railroads through its infancy and well into the stage of generally accepted equipment. Since early in 1952, Mr. Brookmeyer has been assigned to the development of the commercial possibilities in new products for Electro-Motive manufacture.

Electro-Motive will establish a factory branch for rebuilding principal locomotive components at North Salt Lake City, Utah, late in 1954. Construction of the plant will begin next spring. It will consist of an office building 66 ft. square and a 156-ft. by 300-ft. factory building—both one story, of brick, concrete, steel and glass construction. The plant, located on a 16-acre plot adjoining Union Pacific trackage on the south side of 6500 South street, North Salt Lake, plant

For Fast, Low-Cost Removal of Oily, Greasy Dirt... ANYWHERE!

From Diesel Engines...

Two men in 1-1½ hours will do a better cleaning job on road units than several men using wasteful hand methods.

From Trucks and Underbodies...

The quick, sure and thorough method that cuts man hours way down.

From Engine Pits...

A workmanlike means of doing what always used to be a messy operation.

From Concrete Floors...

Keep floors clean and safe. Remove accumulations of greasy, oily dirt.

The cleaning solution you make up with Diesel Magnusol, using one part Magnusol concentrate to eight parts kerosene, diesel oil or safety solvent, is harmless to paints, to metals, and to personnel. It is fumeless, non-toxic and non-flammable. You spray it on... let it soak in... and rinse away with water to leave thoroughly cleaned surfaces.

Use Diesel Magnusol for a Month!

Order a trial drum of Diesel Magnusol. Use it for a month according to our directions. If you are not completely satisfied, we will cancel the full invoice.

magnus CLEANERS

Railroad Division

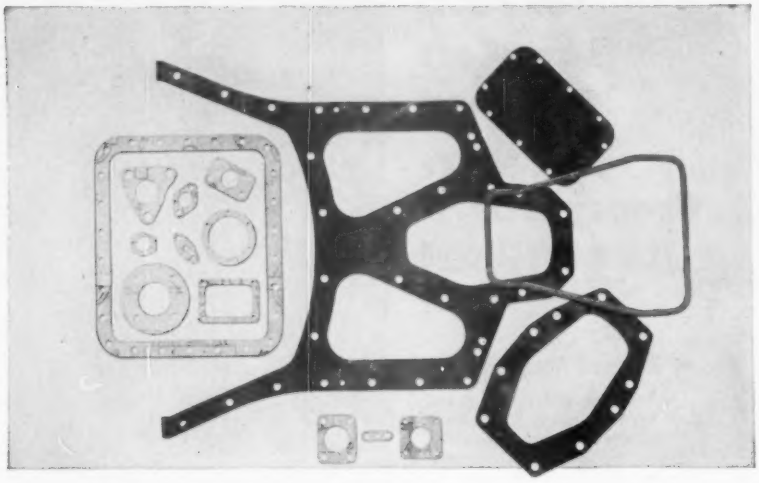
MAGNUS CHEMICAL CO., INC.

77 South Avenue, Garwood, N. J.

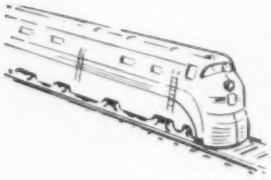
In Canada—Magnus Chemicals, Ltd., Montreal

Representatives in All Principal Cities

Available from GARLOCK–



Replacement gaskets for diesel locomotives



We can furnish direct from our factories in Palmyra, New York, high quality diesel locomotive gasketings in either sheet or gasket form. Garlock gaskets are standard equipment on many diesel locomotives.

Three Garlock gasketing materials widely used on diesel locomotives are:

Cork-Fibre— } For oil at cold to
Vegetable-Fibre— } medium temperatures
Compressed Asbestos—For hot oil and hot water

To order gaskets for your diesel locomotives, just call your Garlock representative.

THE GARLOCK PACKING COMPANY
PALMYRA, NEW YORK
In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS

will serve railroads in northwest territory, roughly from Denver to the Pacific.

It will be equipped to rebuild worn engines, generators, and traction motors with the same materials, methods and machinery used in manufacture of new components at parent factories.

■

McDOUGALL-BUTLLER COMPANY. — *Louis S. Isbell* has been appointed district sales manager for northern New England, with headquarters at Auburn, Me.

■

TUCOLITH SALES CORPORATION.—*E. B. Colven* has been appointed sales engineer at New York. Mr. Colven was formerly with the Ellcon Company, in charge of development and research in connection with railway specialties.

■

APPLETON ELECTRIC COMPANY.—*F. W. Wehrheim* has been elected vice-president in charge of sales, with headquarters at

F. W. Wehrheim

Chicago, succeeding *E. A. Murray*, resigned, Named as assistant to Mr. Wehrheim is *I. W. Strong*, sales representative at Denver, Colo.

■

NATIONAL STEEL CAR CORPORATION.—*J. N. Baird*, sales assistant to president, has been appointed general sales executive, and *H. S. Ashby*, assistant to general sales manger, has been appointed sales manager.

■

SKIL CORPORATION.—Four branch offices have been moved to new locations, as follows: 2800 Park avenue, New York; 2323 Greenmount avenue, Baltimore; 5616 N.E. Glisan street, Portland, Ore.; and 1620 East Riverside drive, Indianapolis.

■

GENERAL STEEL CASTINGS CORPORATION. —*Marcus Jackson*, mechanical engineer—special duties of the South African Railways, has been appointed assistant to vice-president—sales of G.S.C. at Granite City, Ill.

■

GENERAL ELECTRIC COMPANY.—The former Trumbull Electric department of GE has been expanded into two new depart-

ments—the distribution assemblies department and the Trumbull components department. *Elmer T. Carlson* has been appointed general manager of the former, and *Hershner Cross*, general manager of the latter. The headquarters of both departments are located at Plainville, Conn.

■

BRANDON EQUIPMENT COMPANY.—*George G. Prest* has been appointed sales representative of the Company at St. Paul and *Richard Hunter Jenkins* has been appointed sales representative at Washington, D. C.

■

PYLE-NATIONAL COMPANY.—*Richard A. Meck* has rejoined the Multi-Vent division of Pyle-National. Mr. Meck was a sales design engineer from 1947 to 1950 when he left to become associated with the Victor Adding Machine Company.

■

KOPPERS COMPANY.— *Ralph H. Bescher* has been appointed Pittsburgh district manager of sales and operations of the Wood Preserving division. Mr. Bescher was previously manager of the division's technical department at Orrville, Ohio.

■

AEROQUIP CORPORATION.—*Matthew J. Betley* has been appointed vice-president and general manager at Jackson, Mich. Mr. Betley, formerly vice-president—manufacturing, will be responsibile for sales, engineering, financial, and manufacturing.

Obituaries

R. W. THOMPSON, who was chief engineer of the General American Transportation Corporation from 1932 to 1944 and director of engineering until his retirement in August 1952, died on November 27.

■

ARTHUR W. BARTH, president of the Henry Giessel Company, Chicago, died November 23 at Grant Hospital in that city.

■

T. W. MASTERMAN, manager of the western district of the Westinghouse Air Brake Company, Air Brake Division, at Chicago, died on October 23.

PERSONAL MENTION

Bessemer & Lake Erie

DAVID L. STANLEY appointed assistant superintendent motive power at Greenville, Pa.

Chesapeake & Ohio

COMER GRAY, roundhouse foreman, appointed general foreman at Thurmond, W. Va.

G. C. PORTER, general foreman at Thurmond, W. Va., has retired.

Every One
PROOF
TESTED
50%
Beyond
"Safe
Working
Load"
WILLIAMS "VULCAN"® EYE BOLTS, drop-forged in plain or shoulder patterns — blank or threaded. 1. Plain — capacities from .7 to 16 tons. 2. Shoulder — capacities from .2 to 13 tons.
WILLIAMS "VULCAN"® HOIST HOOKS are drop-forged in Shank or Eye (weldless) patterns with throat openings 1 to 4½" and capacities up to 25 tons.
Your triple quality guarantee of SAFETY!
The circular identifying mark on Williams hoist hooks and eye bolts means that each one has been individually proof-tested, on a standard tension machine, to at least 50% beyond its rated "Safe Working Capacity". They are drop-forged, heat-treated and proof-tested to assure you maximum strength and dependable service. Don't accept less. WRITE for Catalog 201.
WILLIAMS
INDUSTRIAL TOOLS
"The Broadest Line of Its Kind"
PLUS Local Service from a Williams Distributor
J. H. WILLIAMS & CO. 413 Vulcan St., Buffalo 7, N. Y.

Chicago, Burlington & Quincy

H. E. HINDS, mechanical engineer at Chicago, retired on November 30.

R. E. TAYLOR, assistant mechanical engineer at Chicago, appointed mechanical engineer.

Denver & Rio Grande Western

E. W. ELLEDGE, general foreman, Burnham shops, appointed system car foreman, with headquarters at Denver, Colo.

E. P. JOHNSTON appointed general car foreman at Pueblo, Colo.

CLARENCE L. OLSON, general foreman at Pueblo, Colo., appointed division car foreman, with headquarters at Denver.

Erie

WILLIAM F. HEDDEN, road foreman of engines, New York division, at Jersey City, N. J., appointed road foreman of engines, Mahoning division, with headquarters at Youngstown, Ohio.

HOWARD B. HART appointed road foreman of engines, New York division, with headquarters at Jersey City.

Chicago, Milwaukee, St. Paul & Pacific

FRANK A. SHOULTY, assistant superintendent car department at Milwaukee, appointed superintendent car department.

Born: Radinor, Ind., May 15, 1889.

Education: High school.

Career: Employed on the Illinois Central, Chicago, Indianapolis & Louisville, and Chicago Tere Haute & Southeastern until 1921 when the latter road was taken over by the C.M.St.P. & P. Served successively as car inspector, car repairman, piecework inspector, locomotive fireman, assistant car foreman, car foreman, wreck foreman, general foreman, and assistant superintendent car department.

Frank A. Shoulty

New York Central

E. H. WRIGHT appointed assistant industrial engineer, with headquarters at New York.

R. W. MUSTARD, assistant industrial engineer at New York, appointed terminal foreman at North Bergen enginehouse.

St. Louis-Southwestern

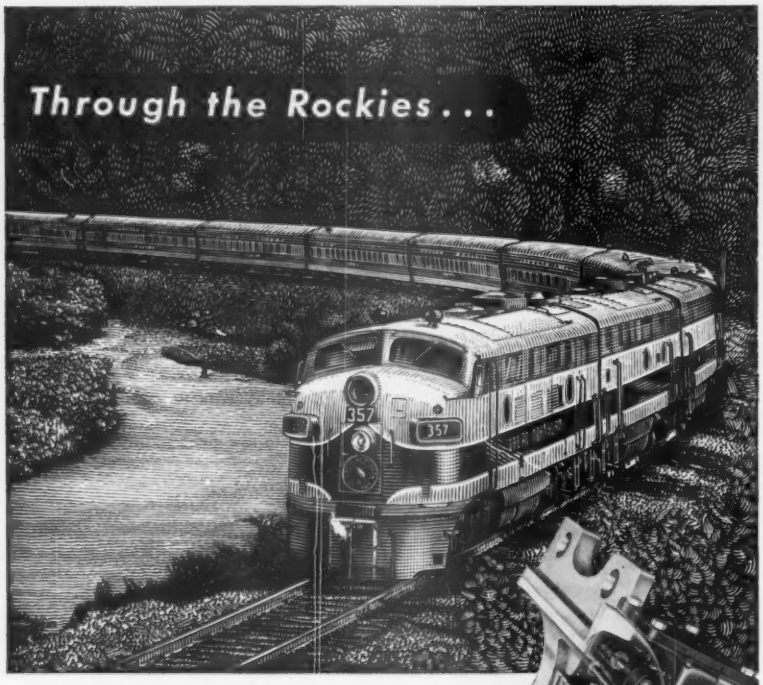
J. Y. ALLEN, JR., car inspector at Tyler, Tex., appointed division car foreman, with headquarters at Tyler.

GROVER C. SCOTT, JR., car inspector at Tyler, Tex., appointed assistant foreman.

Union

M. G. STEVENS, superintendent of motive power and equipment, appointed general superintendent at Pittsburgh, with jurisdiction over the transportation, mechanical and stores departments.

M. G. Stevens



FELPAX Lubricators help keep the "Empire Builder" on schedule

From the first turn of the wheels in Chicago, through the rugged Rockies to Seattle and back again, the suspension bearings on G.N.'s "Empire Builder" get full, continuous lubrication with modern FELPAX LUBRICATORS! Special felt wicks, that last thousands of miles, eliminate waste grabs and starved bearings caused by old fashioned yarn packing.

You can solve *your* suspension bearing lubrication problems, too, with FELPAX LUBRICATORS.

For full information on Modern FELPAX Lubricators see your locomotive builder or write to:

the lubricator that eliminates repacking

MILLER FELPAX LUBRICATOR

MILLER FELPAX CORPORATION
WINONA, MINNESOTA

Seaboard Air Line

W. J. JARRETT, master mechanic Virginia division, at Raleigh, N. C., appointed diesel superintendent, with headquarters at Norfolk, Va.

D. M. WOOD, diesel superintendent at Norfolk Va., at his own request, appointed master mechanic, Virginia division, with headquarters at Raleigh, N. C.

Southern

ERNEST A. MCALOON appointed general foreman car repairs at Atlanta, Ga.

Texas & Pacific

J. O. FRAKER, electrical engineer and diesel supervisor, appointed superintendent diesel and electrical maintenance, a newly created position, with headquarters at Dallas, Tex.

Virginian

G. T. STRONG, JR., general mechanical and air-brake inspector at Princeton, W. Va., appointed master mechanic, New River division, with headquarters at Elmore, W. Va.

JOHN MARCROFT, supervisor of boilers and welding, appointed general mechanical and air-brake inspector, with headquarters at Princeton, W. Va. Former position abolished.

PERSONAL MENTION—Obituary

T. D. SEDWICK, who retired as engineer of tests of the Chicago, Rock Island & Pacific on February 1, 1950, died in Florida on December 4. Mr. Sedwick, after his retirement, was a consultant for the National Aluminate Corporation until April 1952.

NEW DEVICES

(Continued from page 78)

Company, Philadelphia Pa. Both new units, known as Exide Lightguard Models M and T conform fully to the recently revised National Electrical Code, issued in August 1953.

While similar to the prior model, the new units also include recently developed features that increase efficiency and service life.

Each new model is furnished with one 25-watt sealed beam lamp, but is available with two if desired. In the event of power failure, the one-lamp unit of both models will furnish more than eight hours. Two lamp units will furnish light continuously more than three hours.

The units are powered by Exide Type 3-COE-7 batteries, utilizing ¼-in. thick positive plates and an electrolyte of low specific gravity to extend service life while minimizing maintenance. A highly shock resistant transparent plastic container shows each battery plate clearly.

Under normal circumstances, batteries are kept fully charged from the a.c. supply by means of a built-in trickle charger. In case of an a.c. power failure an electrically actuated relay automatically closes to provide emergency lighting. When normal power is restored, the relay turns off the floodlights, and charging is automatically resumed.

BIDDLE *Instrument News*

IF YOU MEASURE SPEED • • • YOUR BEST BET IS BIDDLE

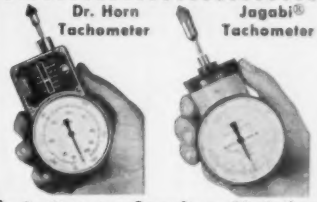
Average Measuring RPM or FPM Jagabi® Speed Indicator

BULLETIN 35-X contains valuable information on Speed Measuring

HANDY SELECTION CHART is helpful to RAILROAD MAINTENANCE MEN

Dr. Horn Tachometer

Jagabi® Tachometer



Instantaneous Speeds or Variations in Speeds. Write for BULLETIN 35-X

Frahm® Resonant Reed Tachometer

Quick Accurate Readings with Safety

BULLETIN 31-P8-X

JAMES G. BIDDLE CO.

ELECTRICAL TESTING INSTRUMENTS

•

SPEED MEASURING INSTRUMENTS

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LABORATORY & SCIENTIFIC EQUIPMENT

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1316 Arch St., Phila. 7, Pa.
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Please send me material checked:
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NAME

JOB FUNCTION

COMPANY

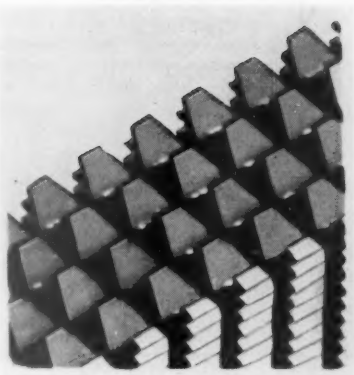
ADDRESS

Thread Restoring Tool

Damaged or deformed external threads can be restored to their original condition without reducing the root or outside diameters by using this device, named Nu-Trix by its manufacturer, Reiff & Nestor Company, Lykens, Pa.

The device eliminates shaping with a three-cornered file or the use of a die, both of which remove metal. Used like a file, a few passes across the damaged threads will remove burrs and deformed metal and reshape the threads.

The restorer is fabricated from hardened steel and is 8½ in. long and 7/16 in. square. It is available for either National Coarse or National Fine threads. There are eight thread sizes on each tool. No. 1 (National Coarse) is for 11, 12, 13, 14, 16, 18, 20 and 24 threads per in. No. 2 (SAE) is for 9, 10, 15, 16, 20, 26, 28 and 32 threads per in.



■

Surface Temperature Thermometers

Type RdF Stikon thermometers now being made by the Minneapolis-Honeywell Regulator Company, Philadelphia 44, Pa., afford a means of making rapid and accurate measurements of surface temperatures within the range of — 100 to + 400 deg. F. even under extremely restricted space limitations.

The thermometers illustrated are used in conjunction with Electronik instruments. They are grids of very fine nickel wire, bonded into wafers of Bakelite or nitrocellulose cement and paper. The size of the wafer may be as small as ¾ by 5/16 in. and the thickness is not over .006 in. These primary elements are attached to the surface of the object, the temperature of which is to be measured, by cement, such as Duco household cement, Epon resin cement or Bakelite cement. Changes in temperature of the object will cause corresponding changes in resistance of the nickel wire, and when the element is connected into the resistance thermometer circuit of the Electronik instrument, the temperature can be read directly on the scale.

These elements can be mounted on any smooth surface, whether plane or not, without drilling, machining or other shaping. Owing to the extremely small mass of the wire, and the very small amount of insulation needed, the speed of response is very high.

■

Wire Braided Butane Hose

Designed for handling of liquefied petroleum gases, this butane hose features a non-porous and oil resistant rubber tube combining layers of horizontally

(*Continued on page 96*)

Paint more cars per day with *A. F. I. Brand* Finishes

Emporia Shop of the Santa Fe provides a fine example of modern paint shop methods.

A group of A.F.I. quick-drying freight car paints are used in the Emporia operation as well as in the shops of other railway lines.

The advantages of A.F.I. products for railway freight car painting are:

1. ***Higher output of cars per day***
2. ***Proper film thickness.***
3. ***Quick drying.***
4. ***Higher gloss, cleaner cars.***
5. ***Excellent durability.***
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Numerous A.F.I. paint products for diesel locomotives, refrigerator and passenger cars are used by many other leading railroads throughout the country.

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● This country's railroads have demonstrated NATIONAL CARBON'S claim to greater operating economy by using far more "National" diesel-electric traction-motor and generator brushes than all other makes combined.

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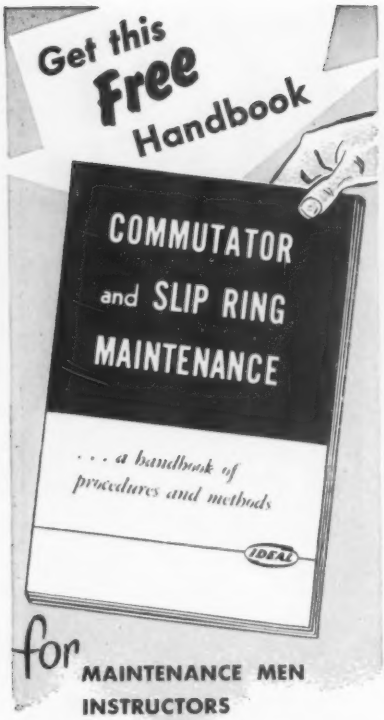

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INSTRUCTORS
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THE methods and procedures described were developed by recognized, practicing maintenance authorities. They have been proven by conclusive evidence over many years in hundreds of operations. A concise guide, this 39-page handbook tells the practical operating man everything he needs to know about:

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- **Brush maintenance and operating procedure.**
- **General maintenance procedure.**

Dozens of illustrations show the operations described. Condensed data on IDEAL commutator and slip ring products is included.
Even if you do not have a regular maintenance training program, your people responsible for motor and generator maintenance need, and will do a better job, with the help of this handbook.

NOTE: **This offer is limited to those in plant and other industrial operations. We reserve right to limit quantities furnished. Offer may be withdrawn at any time.**

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braided steel wire and rayon cord reinforcement.

Announced by the Quaker Rubber Corporation, Division of H. K. Porter Company, Inc., Philadelphia, Pa., it is named Ironsides Butane-Propane hose.

Made on a mandrel to insure uniform inside diameter, it is manufactured in sizes from ½ to 2 in. Each size has a minimum bursting pressure of 1,750 lb. per sq. in. with actual bursting pressures exceeding 2,300 lb. per sq. in. Each length has two separate static wires, interlaced with reinforcing braids, to insure full static conductivity.

■

Automatic Electric Pump House Heater

An automatic, absolutely safe, electric heater specifically engineered for the pump house has been made available by the Electromode Corporation, Rochester 3, N. Y. It eliminates the risk of damage caused by water pipes freezing because of inadequate heat, and the danger of fire which might be caused by unsafe means of heating.

The heater has a sealed in aluminum heating element. There are no exposed glowing red hot wires. It has the Underwriters' Laboratories approval. The built-in thermostat may be set for the temperature

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There's a reason why Kraftbilt Horizontal Rollfiles come in sections, which are added as needed. They require no additional floor space. Every map is reachable—also findable through ingenious indexing. Top quality steel construction—fire-resistant. Disappearing doors, when closed, lock out dust, moisture, insects, pilferers. **Must** please you or you return them. Used by Clinchfield, Missouri Pacific, General Motors, Douglas Aircraft, Shell Oil—other leaders. To meet your problem, ask for Catalog 352-B.

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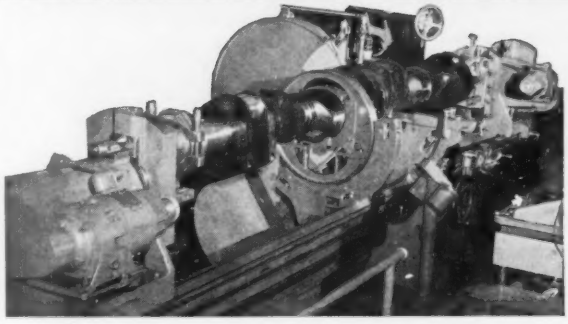

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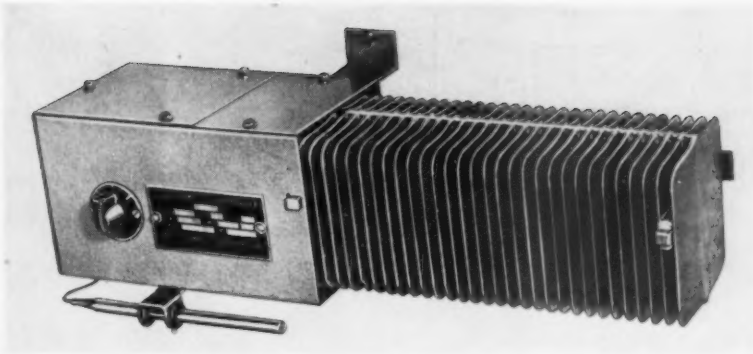

Portable Hydraulic Angle Iron Cutter

This device, according to the manufacturer, cuts with a straight, clean shear and causes no deformation of the angle iron end. It is manufactured by the Manco Manufacturing Company, Bradley, Ill.

The unit is available in portable models with hand-pump hydraulic action for use in field erection work. For production cutting applications, electric hydraulic pumps can be supplied.

Capacity of the Model A-20-B is 3 in. by 3 in. by ¼ in. or 2½ in. by 2½ in.

desired and operation is entirely automatic.

Wall brackets are provided to mount theheater on the wall and installation is simple. It is only necessary to run two wires, 120-volt or 240-volt as required, to the heater connection box.

■

■

Two Filament Flashlight

An new type of flashlight which can throw either a concentrated spotlight beam for long range use or a diffused floodlight beam for close range, both controlled by a single switch, has been announced by National Carbon Company, New York 17.

Known as the Eveready No. 7253 Spot-Flood Flashlight, it makes use of a new Eveready double-filament lamp which is similar in principle to that used in automobile headlamps. The lamp also provides an extra margin of safety in that if one of the two filaments burns out, the other is always available for immediate use.

The light is made with a polyethylene lens-guard ring-hanger and heavy-gage seamless brass case, chrome-plated on nickel for lasting finish.

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"Heads or tails you still WIN . . . because 'locked-in' values 'lock-out' trouble and make this the most economical of all Diesel Filter Cartridges!"

"REASON?

There's never any gamble with lower cost performance; longer service life; smaller initial cost and reduced end costs!"

*"I'm the trade-mark of the Nash-Finch Company—and registered too!"

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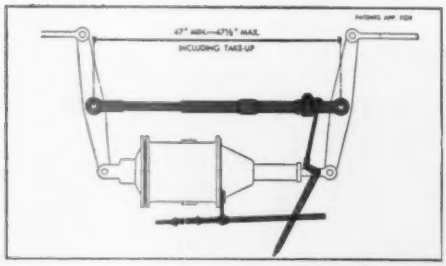
The Franklin Automatic Brake Slack Adjuster



Adjuster is fully automatic in maintaining the predetermined travel of the brake cylinder piston. Operating on the pawl and ratchet principle, it has sufficient take-up so that no manual adjustment is required during the life of the brake shoes. It replaces, or is installed in, the pull or tie rod connection, and is easily applied to any type of new or existing freight cars — including hopper cars.

On cars equipped with the Franklin Automatic Brake Slack Adjuster, it is not necessary to disconnect the brake rigging to replace worn brake shoes. Also, a simple and convenient reset arrangement, operated from outside the rails, restores the desired piston travel before the car is returned to service.

Bulletin B-1201 gives full information.

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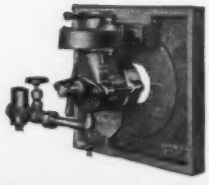

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by 5/16 in. angle. It does not have to be bolted down or otherwise mounted for operation. Adaptations of units are also available for cutting special shapes such as channel or H-beam.

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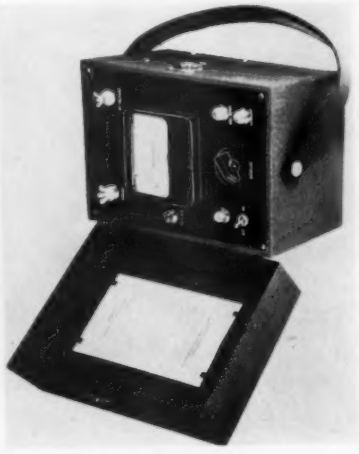
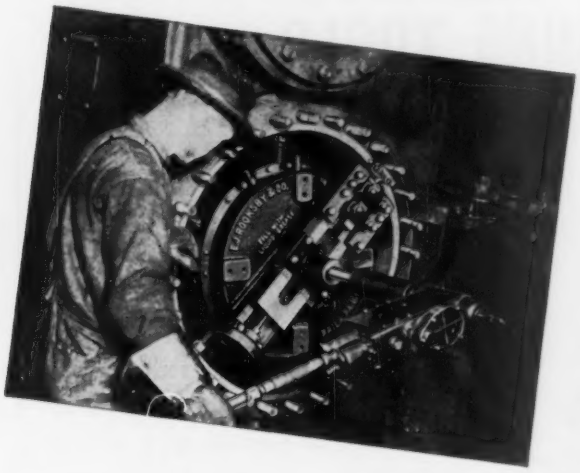


High Voltage Testing Instrument

An addition to its line of high-voltage testing instruments, which extends the range of output voltage available to 10,000 volts a.c. in a portable type instrument, has been announced by associated Research, Inc., 3758 W. Belmont avenue, Chicago 18. Designated the Hypot Junior Model No. 422, this instrument features visual indication of electrical leakage and breakdown, continuously variable voltage output from 0-10,000 volts, and a kilovolt meter connected directly across the high voltage output for accurate indication to plus or minus 3 per cent of full scale regardless of load characteristics. Input is 115 volts 60 cycle a.c.

The instrument is housed in a steel case 11 ½ in. x 8 ½ in. x 10 in. with a removable hinged cover. Net weight is approximately 25 lb.



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The engineman spots a leaky cylinder flange joint. With a Rooksby Portable Flange Facing Machine, the joint is quickly refaced — *without removing the piston from the cylinder.* The engine leaves the roundhouse right on schedule.

Rooksby Portable Machine Tools provide a valuable, time-saving "working kit" for roundhouse or shop. They are quickly set-up and perform a variety of useful jobs accurately and dependably. These Rooksby products mean more road time for your locomotives—Cylinder Boring Bars—Valve Chamber Boring Bars—Crank Pin Turning Machines—Cylinder Flange Facing Machines.

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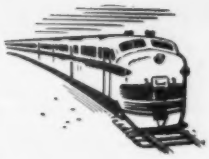
MACHINE TOOLS

Order EX-CELL-O Pins and Bushings *From Stock!*



FOR LOCOMOTIVES, PASSENGER AND FREIGHT CARS

If your railroad pins and bushings are among Ex-Cell-O's wide range of standard sizes, you can save money and expedite delivery by ordering directly from stock. You'll get highest quality materials and workmanship, as evidenced by the fact that more than 200 railroads and equipment builders depend on Ex-Cell-O for hardened and ground steel pins and bushings. Order them directly from the convenient Ex-Cell-O Catalog.

For a complete listing of standard Ex-Cell-O Pins and Bushings for Diesel and steam locomotives and passenger car equipment, write for new Ex-Cell-O Bulletin 32428.

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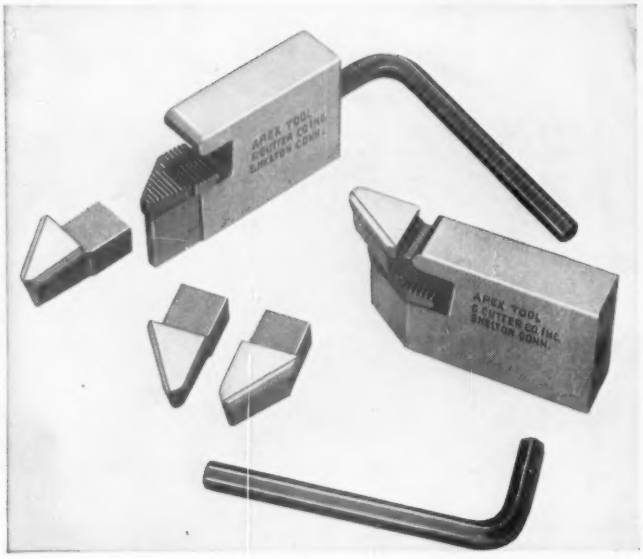

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Standard holders with inserted carbide-tipped tool bits reduce your costs and give improved working conditions. All tool bits are furnished finished ground with chip breakers and are ready for immediate use. Tool bits are adjustable in two directions to compensate for wear.

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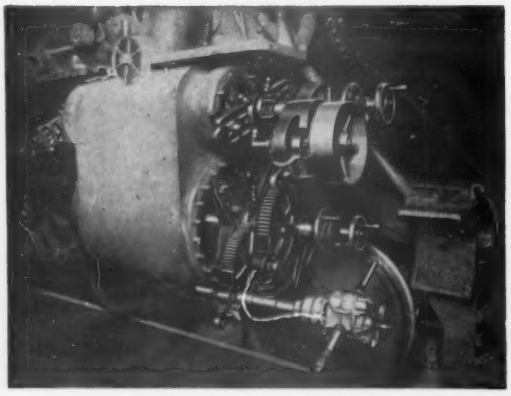
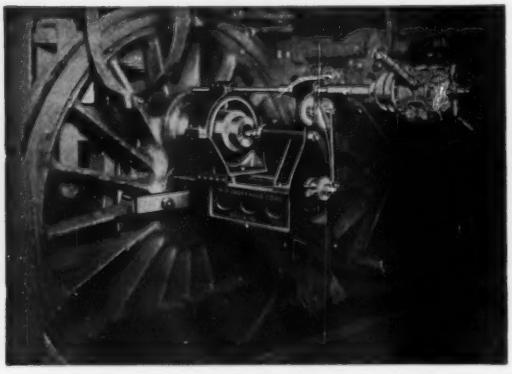
For Railway Shops and Engine Houses



Left: The Underwood Boring Bar illustrated is designed for reboring all sizes of locomotive cylinders and valve chambers.

Below: The Underwood Portable Crankpin Turning Machine returning crankpin in position.



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- Rotary Planing Machines
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...it's a "504"
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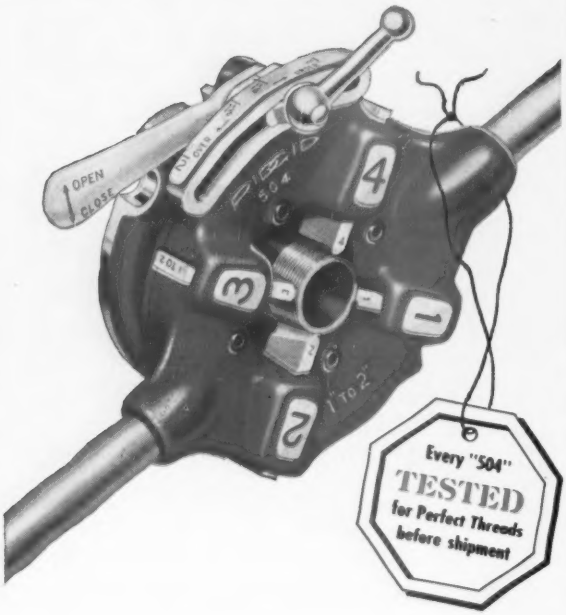

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...TO PREVENT DAMAGE BY ACCIDENTAL OVERSPEEDING ON A WRONG RANGE

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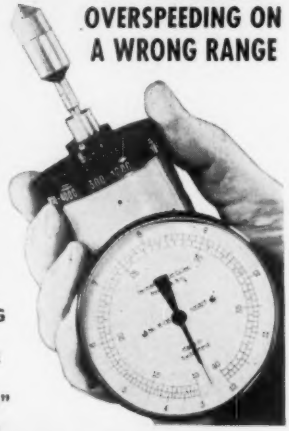

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Sweeney POWERENCH TOOLS
for diesel engine maintenance

THE SWE-71 TORQUE TESTER pictured here accurately tests all torque wrenches in a matter of seconds.

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Rebuilt traction motors all ***look*** pretty much alike. But looks don't count. Mileage records ***do.*** Those cost-per-mile records are all-important. That's why National isn't happy with "standard" performance. To us, a "standard" is a minimum, ***and must be surpassed.*** Our engineering — our shop — everything we do — is geared to that thinking. A National rebuilt traction motor is ***better*** than standard. Many railroads know it, and cash in on it. If ***you*** don't, remember there's a National field engineer near you with facts and figures and proof.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

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Santa Fe's 30 new "reefers" are "Roller Freight"

—progress that more than pays its own way!

WITH 30 new refrigerator cars on Timken® tapered roller bearings, Santa Fe is *more* than living up to its slogan—"Progress that pays its own way".

Timken bearings remove all speed restrictions due to bearings, permitting sustained high speeds that will help Santa Fe rush perishables to market in tip-top condition.

Besides eliminating speed restrictions, Timken bearings are the answer to the No. 1 cause of freight train delays—the hot box. Railroads are now paying for hot boxes at the rate of $55 million a year. Last year, with their friction bearing cars, they averaged only 251,920 car-miles between set-outs for hot boxes. According to the University of Illinois Bulletin #406, car-miles between set-outs for hot boxes is a poor measure of overall bearing performance. Based on the number of cars repaired for hot boxes, the average car-miles per hot box would be less than 70,000. Since Timken bearings *roll* the load, the hot box problem is eliminated.

Timken bearings also speed up freight because they require 90% fewer man-hours for terminal bearing inspection. All your men have to do is feel the journal box cover. And Timken bearings give lading a smoother ride because they cut starting resistance 88%. Cars can start jolt-free.

"Roller Freight" is the next great step in railroading. It can be the railroads' big selling point in going after tomorrow's freight business. And when all railroads go "Roller Freight," they'll save an estimated $190 million a year, net a 22% return on the investment. For more information, write: The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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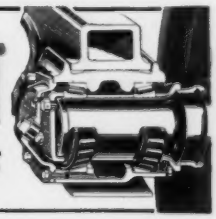
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION →⬭←